THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXXVI. No. 899.] LONDON, AUGUST 3, 1880. [32ND YEAR. Price 6d.

GAS PURIFICATION
BY
OXIDE OF IRON.

COOKE BROS.,
CENTRAL DEPÔTS:
CO. DONEGAL, IRELAND;
LONDON DEPÔT:
ERITH,
OFFICES:
2, CROSBY SQUARE,
LONDON, E.C.

GENUINE TORBAY PAINT
And SPECIAL GASOMETER PAINT.
SEVERAL PRIZE MEDALS. ESTABLISHED OVER 20 YEARS.
These Paints are now used by all the London Gas Companies and most of the principal Country Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. Also used by the Admiralty, War Office, Railway Companies, Founders, &c. They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations; do not crack, blister, or flake off; will cover tar effectually.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.
Supplied, mixed ready for use, or in paste, as desired.
TORBAY PAINT COMPANY.
PROPRIETORS: STEVENS & CO.,
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WORKS: BRIXHAM, TORBAY.

TUBES.
Tubes and Fittings for Gas, Steam, Water, and Hydraulic purposes, plain, galvanized, white enamelled inside, or coated by Dr. Angus Smith's process, or oxidized by Professor Barff's patent process. Gas-fitters tools, brass cocks, &c.

JOHN SPENCER,
VULCAN TUBE WORKS,
WEST BROMWICH, STAFFORDSHIRE,
AND
97, CANNON STREET, LONDON.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
JOS. COWEN & Co. are the only Manufacturers of FIRE-BRICKS and CLAY RETORTS at BLAYDON BURN.

JOHN RUSSELL & CO.,
LIMITED,
Established at the commencement of Gas Lighting,
MANUFACTURERS OF
TUBES AND FITTINGS.
THREE PRIZE MEDALS,
Paris, 1878.
HEAD LONDON OFFICE:
145, QUEEN VICTORIA STREET.
ALMA TUBE-WORKS, WALSALL;
OLD PATENT TUBE-WORKS, WEDNESBURY.

JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
LICENSEES AND MANUFACTURERS OF
HUNT'S
PATENT COMPENSATING METERS,
STREET-LAMPS, &c., &c.
ESTABLISHED 1830.

THOMAS PIGGOTT & CO.,
SPRING HILL, BIRMINGHAM,
MANUFACTURERS OF
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Flue, Saddle, and Range Boilers.
SUGAR, SALTPETER, AND ALL KINDS OF PANS.
Roofs, Girders, and Bridges, and General Smith's Work.
London Offices: 97, CANNON STREET—
JAMES E. & SAMUEL SPENCER, Agents.

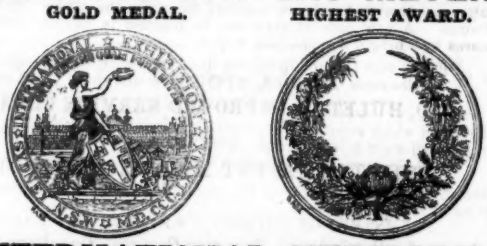
THE
"OTTO" GAS-ENGINE,
From ½ to 40 H.P. ind.

See Page 166.

CROSSLEY BROTHERS,
MANCHESTER AND LONDON.

THE
DUKE OF HAMILTON'S
LESMAHAGOW
CANNEL COAL.
AGENT:
JAMES M'KELVIE,
HAYMARKET,
EDINBURGH.
ESTABLISHED 1840.

GEORGE GLOVER AND CO.,
PATENTEES OF THE
NATIONAL STANDARD GASOMETERS
AND MANUFACTURERS OF
IMPROVED DRY GAS-METERS.
GOLD MEDAL. HIGHEST AWARD.



INTERNATIONAL EXHIBITION,
SYDNEY, 1880.
RANELAGH WORKS, ROYAL AVENUE, CHELSEA, LONDON, S.W.
1, LANCASTER AVENUE, MANCHESTER.
Foreign Agents: DAHL BROS., Copenhagen; A. FAAS & CO., Frankfort-on-Maine; W. HOVEN & SON, Rotterdam; COPLAND & M'LAREN, Montreal; A. DEMPSTER, 57, Elisabeth Street, Melbourne.

WELLINGTON TUBE WORKS,

GREAT BRIDGE, TIPTON, STAFFORDSHIRE.

JOSEPH AIRD,

GAS, STEAM, AND HYDRAULIC TUBES AND FITTINGS.

DANIEL HOWARD,

(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER AND BOILER WORKS,

WEST BROMWICH, NEAR BIRMINGHAM (Established 1765),

MANUFACTURER OF

TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST-IRON TANKS FOR DITTO.

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, AND ALL KINDS OF GAS APPARATUS.

WROUGHT-IRON ROOFS, BRIDGES, GIRDERS, ETC.

STEAM, HOT WATER, AND RANGE BOILERS, TANKS, CISTERNS, BOATS,

AND ALL KINDS OF WROUGHT-IRON WORK.

Drawings, Specifications, and Estimates supplied on application.

GOLDSMITH'S PATENT SIGHT WATER-LINE INDICATING GAS-METER.

MANUFACTURED BY GUEST AND CHRIMES,

FOUNDRY AND GENERAL BRASS WORKS, ROTHERHAM;

AND 85, SOUTHWARK ST., LONDON, S.E.

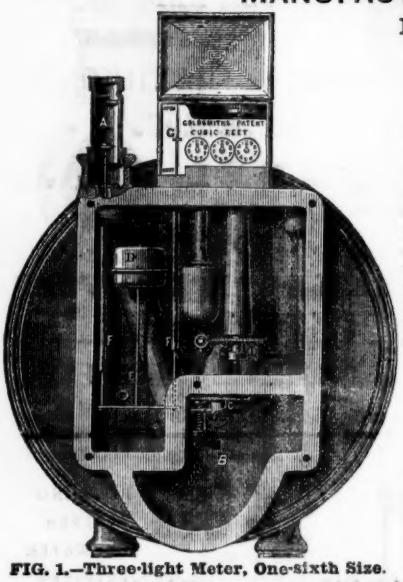


FIG. 1.—Three-light Meter, One-sixth Size.

Fig. 1 is a Meter with front removed to show the arrangement and connection of the Indicator and Valve.

Fig. 2 is front view of Index, with cover up.

The principal object of this invention is to render the water-line in the reservoir at all times visible. It will be seen, by reference to the illustrations, that this is accomplished in the following manner:—On the dial are the words "Open" and "Shut," and attached to the float is the pointer G, which rises and falls with the water-line in the reservoir. If the pointer is at "Open," it shows that the valve is open, and that the reservoir is full. If it is at "Shut," it shows that the reservoir is empty, and that the gas will be shut off.

The following ADVANTAGES will be obvious:—

1. The Inspector can see at a glance if the Meter requires water.
2. No more water than is required need be added, and therefore no water has to run out.
3. The Meter Inspector will be spared a great deal of his most objectionable work, and he will save a great deal of time and trouble.
4. The consumer will not always have to be asked for water, nor will he have to endure the unpleasant smell caused by waste water being run out.

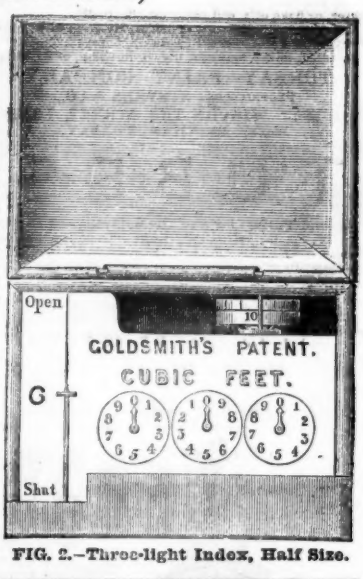
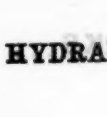


FIG. 2.—Three-light Index, Half Size.

TRADE MARK.



THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

CROWN TUBE-WORKS,

WEDNESBURY, STAFFORDSHIRE.

WAREHOUSE: SOUTHWARK STREET, LONDON.

JAMES RUSSELL & SONS, LIMITED,

PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;

LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.,

GAS-FITTERS TOOLS, VALVES, COCKS, &c.

THOMAS PIGGOTT & CO.,

(Established 1822,)

SPRING HILL, BIRMINGHAM.

MANUFACTURERS OF

TELESCOPIC & SINGLE GASHOLDERS,

CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

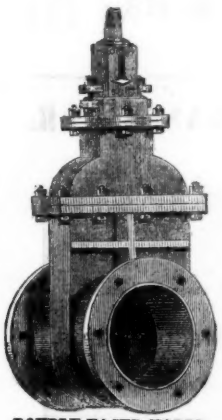
By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

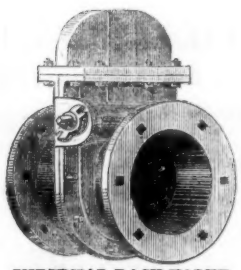
Drawings, Specifications, and Estimates supplied on application.

LONDON OFFICES. 47, CANNON STREET—JAMES E. & SAMUEL SPENCER, AGENTS.

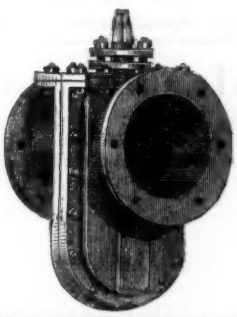
C. & W. WALKERS' GAS-VALVES.



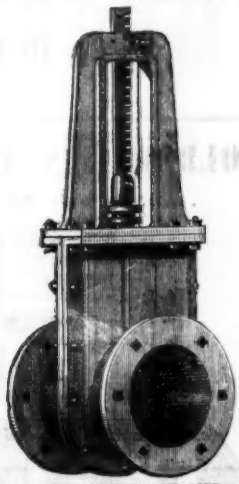
DOUBLE-FACED VALVE SPECIALLY FOR PURIFIERS.



INTERNAL RACK-VALVE WITH STEEL PINION, FOR GENERAL USE.



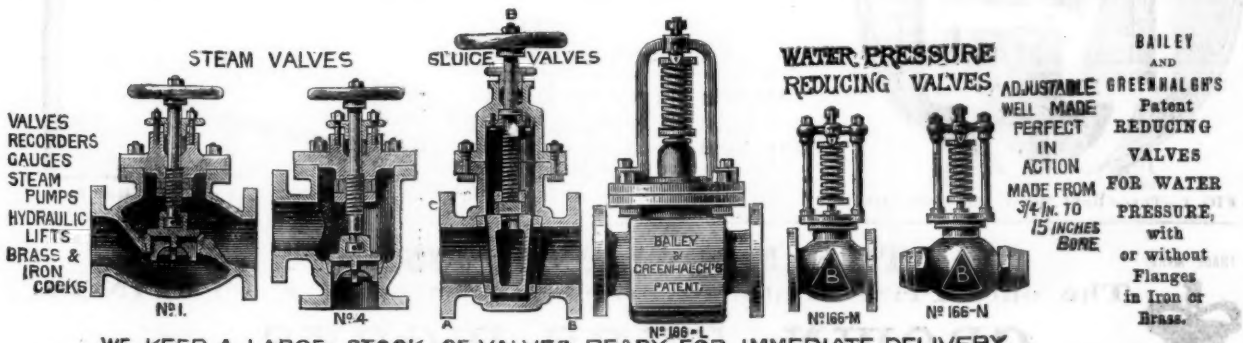
UNDERGROUND SCREW-VALVE FOR SHALLOW STREET-MAINS.



ORDINARY RACK AND PINION VALVE.

MIDLAND IRON-WORKS,

DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.



WE KEEP A LARGE STOCK OF VALVES READY FOR IMMEDIATE DELIVERY.

W. & H. BAILEY CO., Valve and Cock Makers, General Brass Founders for Gas and Water Works, ALBION WORKS, SALFORD, MANCHESTER.

ROBT. DEMPSTER & SONS,

GAS ENGINEERS, IRONFOUNDERS, AND CONTRACTORS,

ROSE MOUNT IRON-WORKS, ELLAND, YORKSHIRE.

MANUFACTURERS OF EVERY DESCRIPTION OF

GAS APPARATUS;

CONTRACTORS FOR THE

ERECTION OF PUBLIC AND PRIVATE GAS-WORKS.

Plans and Specifications Prepared, and Illustrated Catalogues forwarded on application.

GAS PURIFICATION

BY

OXIDE OF IRON.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.

JOHN WM. O'NEILL, Managing Director.

GAS *v.* ELECTRIC LIGHT.

WIGHAM'S PATENT LIGHTHOUSE GAS-BURNERS,

For Street Lighting and the Illumination of Large Halls, Factories, Ship Yards, &c., where Powerful Light is required

These Burners have been adopted by a School Board, having large school-rooms in charge, because of their high illuminating power and the facilities they give for perfect ventilation. The actinic power of these Burners is such that they are used successfully for Photography and Photo-Lithography.

SOLE MANUFACTURERS:

J. EDMUNDSON & CO., Gas Engineers, 19, GREAT GEORGE STREET, WESTMINSTER, LONDON, S.W.

MECHANICAL CONDENSATION.

The undersigned has arranged with Messrs. Pelouze and Audouin the exclusive agency for their patented system of Condensation, in Great Britain and the Colonies.

The following are some of the advantages which this philosophic mode of arresting liquefiable vapours possesses:—

1. It acts irrespective of temperature.
2. It requires no motive power, but automatically adapts itself to production.
3. It may be fixed directly after the hydraulic main, by which prolonged contact of the gas with tar is avoided, and the highest standard of illuminating power is obtained which the coal is capable of giving; or it may be fixed directly after an ordinary air condenser, when it will arrest the vapoury globules which cooling alone will not stop, and the production of tar and ammonia water is thereby increased.
4. It effects a considerable saving in purification, through no tar getting to the material to clog its action.
5. It entirely supersedes the necessity of scrubbers; and if wet sawdust be used in a purifier, washers also are unnecessary.
6. It occupies but little space, and avoids that which is now considered a disadvantage—the too much cooling, scrubbing, and washing of gas.

Further particulars may be obtained of

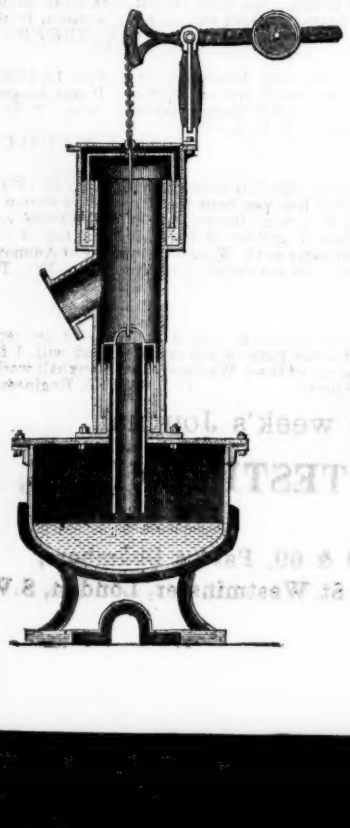
GEO. BOWER, St. Neots, Hunts.

NOTE.—*Gas-works contracted for complete, or apparatus supplied in detail from the retort to the burner. "The Gas and Water Engineer's Book of Reference," post free, 5s. "Handy Abstract of the Public Health Act, 1875," post free, 1s.*

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



The following Testimonials, as to five years constant working of this Patent Removable Dip, have been received:—

Metropolitan District Asylum Gas-Works, Caterham, Surrey, Jan. 15, 1874.

Messrs. CHANDLER and SONS.

DEAR SIRS,

In reply to your inquiries, I beg to inform you that since I have used your Patented Dips (ten in number), I find my make has increased over 1000 cubic feet per ton of coal carbonized, my usual make being 9070 cubic feet before using your Dips, and 10,150 cubic feet since using them.

Metropolitan District Asylum Gas-Works, Caterham, Surrey, Dec. 30, 1879.

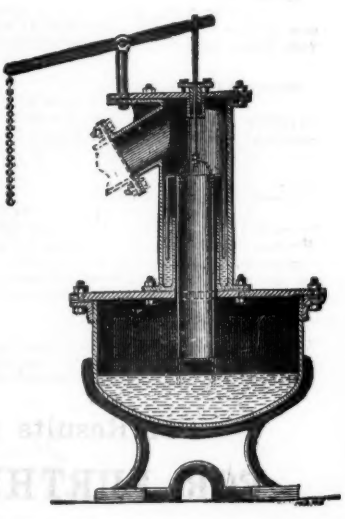
Messrs. CHANDLER and SONS.

DEAR SIRS,

In reply to your inquiry, it is with very much pleasure thatI endorse every word of my letter of Jan. 15, 1874; and I may add that from the date the Patent Dips were fitted, they have worked perfectly, and there is very little carbon deposited in the retorts, in consequence of the lower pressure.

Yours faithfully,

(Signed) W. CRICKMAY,
Memb. Soc. Engineers.



APPLICATIONS TO BE MADE TO

Messrs. CHANDLER & SONS,

104, NEWINGTON CAUSEWAY, S.E.

KIRKHAM, HULETT, & CHANDLER, LIMITED.

PATENT "STANDARD" WASHER-SCRUBBER,

FOR

GAS PURIFICATION,

TAKES OUT EVERY TRACE OF AMMONIA AND A LARGE QUANTITY OF CARBONIC ACID AND SULPHURETTED HYDROGEN BY ONCE PASSING THROUGH THE MACHINE.

AMMONIACAL LIQUOR OBTAINED OF ANY REQUIRED STRENGTH.

The Cost of the Machine defrayed by the Ammonia obtained in Twelve Months.

It requires very little attention, and cannot get out of order.

These Machines, which contain from 3200 feet to 65,000 feet of Wetted Surface, are supplied to the following Gas-Works:—

	Feet per Day.
The Gaslight Company, London—	
Beckton	5,000,000
Bromley	7,000,000
St. Pancras	3,000,000
Bradford Corporation	1,000,000
Bremen	150,000
Buxton Local Board	250,000
Dukinfield Local Board	500,000
Driffield Company	100,000
Goole Company	250,000
Glossop Company	300,000
Holywood Company	125,000
Heywood Local Board	600,000
Leeds Corporation	2,000,000
Leominster Company	150,000
Maidstone Company	1,000,000
Phœnix Company, Greenwich	2,500,000
" " Vauxhall	3,000,000
Woolwich Equitable Company	400,000
Yeadon Company	500,000

And many in course of Construction, among others—

Feet per Day each.	For
Four for 3,000,000	Corporation of Leeds.
Three " 1,750,000	Corporation of Salford. [Station.
One " 2,500,000	The Gaslight Co., Shoreditch
Two " 1,250,000	The Gaslight Company, Beckton.
One " 3,000,000	London Gas Co., Nine Elms.
One " 1,250,000	Corporation of Nottingham.
One " 2,000,000	Cheltenham Gas Company.
One for 1,000,000	West Bromwich Improvement [Commissioners.
One " 750,000	Radcliffe and Pilkington Gas Co.
One " 500,000	Oldbury Local Board.
One " 150,000	Falmouth Gas Company.
One " 250,000	European Gas Company, Rouen.
One " 200,000	Deal Gas Company.

TESTIMONIALS.

Messrs. Kirkham and Hersey. *The Gaslight and Coke Company, Beckton, North Woolwich, June* 8, 1880.

Gentlemen,—I enclose you some particulars of the working of your Washers here, and I intend having some more experiments made, as just now we are working the first Washer with liquor, and the second with water. Of course the fact of our having ordered two more in addition to the four which we have in use is a sufficient indication of my opinion of the value of the Washer. (Signed) G. C. TREWBY.

Messrs. Kirkham and Hersey. *South Metropolitan (late Phœnix) Gaslight Company, Engineer's Office, June* 19, 1880.

Dear Sirs,—The "Standard" Washer which you supplied for use at our Vauxhall station has afforded me entire satisfaction. It was designed to remove the ammonia from 3 million cubic feet of gas per day, and during the past winter it did so with a good working margin to spare. It is as excellent now in workmanship as in design, and is well worthy of the general acceptance with which it appears to be meeting.

I am, respectfully yours, (Signed) CORBET WOODALL.

Messrs. Kirkham and Hersey. *Phœnix Gaslight and Coke Company, Office, Greenwich, S.E., Aug.* 12, 1879.

Gentlemen,—In reply to your inquiry, one of your Patent Scrubber-Washers to purify 100,000 cubic feet per hour was put into operation at these works on the 1st of June. At the same moment the whole of our Scrubbers, equal to 28,000 cubic feet, were thrown out of use, leaving your Washer the whole work of freeing the gas from Ammonia. This it has done to perfection up to date. With 10 gallons of water to each ton of coal carbonized passing through it we get a clean test at the seventh chamber, leaving four chambers margin for extra work. The mean quantity of Ammonia in the inlet (fixed and free), obtained from a large number of tests, was 241 grains per 100 feet of gas. On the outlet—Free Ammonia—Nil. The quantity of water used is 10 gallons per ton of coal carbonized. The strength of liquor as follows:—

Chamber No.	1	2	3	4	5	6	7	8	9	10	11
Strength of liquor—ounces	Nil.	Nil.	Nil.	Nil.	0·4	1·0	2·2	3·5	5·5	8·25	12·5

We are working five revolutions per minute. It takes out all the free Ammonia, reduces the carbonic acid and sulphuretted hydrogen 30 per cent., requires a very small amount of power to drive, and altogether is, in my opinion, the best machine for the purpose yet invented, and will, I feel confident, ere long, entirely supersede the Scrubbers of to-day. I am glad to find you are going to fix one of these Washers at our Vauxhall works.

(Signed) P. J. WATES, Engineer.

For Results and other Testimonials, see next week's Journal.

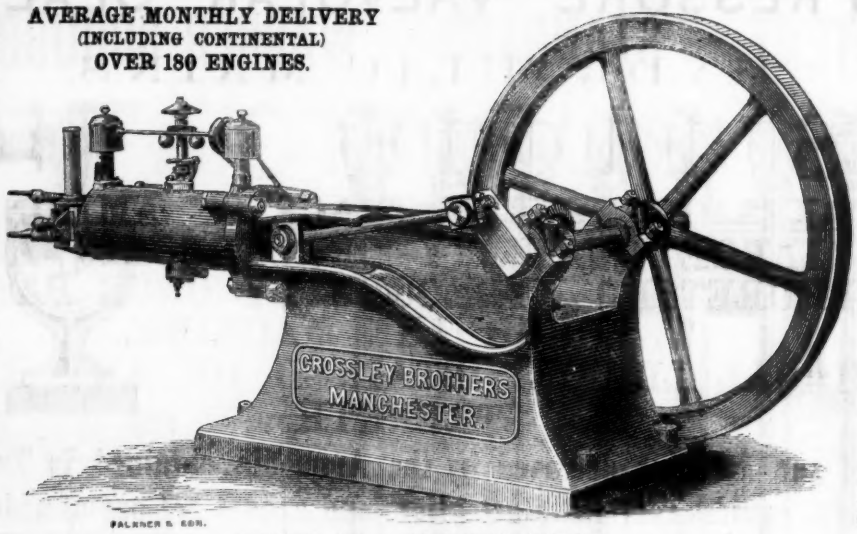
FOR FURTHER PARTICULARS AND TESTIMONIALS, ADDRESS MESSRS.

KIRKHAM, HULETT, & CHANDLER, LIMITED, { 59 & 60, Palace Chambers, Bridge St. Westminster, London, S.W.

AN ENGINE WHICH WORKS WITHOUT A BOILER OR STEAM

These Engines are used at the following Gas-Works:—Birmingham, Brentford, Bucharest, Bishop Stortford, Driffield, Dundalk, Dundee, Dublin, Huddersfield, Hinckley. London—London Gas-Works, Phœnix Gas Co., Gaslight and Coke Co., South Metropolitan Gas Co., Commercial Gas Co., Crystal Palace District. Leominster, Edinburgh and Leith, Ludlow Union, Lancaster, Maidstone, Nuneaton, Northampton, Shanghai, Sheffield, Worcester, Wantage, &c.

AVERAGE MONTHLY DELIVERY
(INCLUDING CONTINENTAL)
OVER 180 ENGINES.



Over 2500 already delivered.

Very numerous Testimonials from Users, including Engineers, Men of Science, and others, on application to the makers.

No trouble with Coal, Ashes, Smoke, Insurance, Water, or constant attendance.

No Glands to pack, or Water Gauges and Steam Gauges to watch.

STARTS AT A MOMENT'S NOTICE.

THE "OTTO" SILENT GAS-ENGINE,

From ½ to 40 Horse Power Indicated.

(Otto and Crossley's Patents, 1876 and 1877.)

THEY ARE USED FOR ALL KINDS OF PURPOSES, CHIEFLY FOR EXHAUSTERS, SCRUBBERS, & PUMPS.

DELIVERED IN MANCHESTER. CASES NOT CHARGED IF RETURNED FREE.

PRICES INCLUDE CAST-IRON STAND, TURNED FLY-WHEEL, AND DRIVING PULLEY; WATER-VESSEL, SEVERAL DUPLICATES, AND GAS-FITTINGS (EXCEPTING METER AND PIPES).

WORKS AND HEAD OFFICES:
Gt. Marlbro' St., Gloster St.

CROSSLEY BROTHERS,

MANCHESTER.

LONDON HOUSE:
116, Queen Victoria St., E.C.

EDWARD E. CROMBIE & CO.,

INVENTORS AND PATENTEES
OF THE

FRICTIONLESS DRY GAS-METERS,

Beg to intimate to Gas Companies and others that they are now prepared to supply these very superior Meters at the same prices as for the ordinary Gas-Meters.

In the construction of this Meter, for which the best tin plates only are used, every mechanical contrivance has been taken advantage of successfully to reduce the friction to a minimum, which is amply proved by the fact that they are made to work upon only one-fortieth of an inch pressure. By an improvement also in their construction, a steadier light is obtained, and greater capacity than can be got from any other Meter in the market. No gas can pass under the valves on any back pressure, as is the case with many other Dry Meters.

To Gas Companies supplying gas through streets with heavy gradients, these Meters are invaluable, as much gas is saved from the low pressure required to work them.

ALL METERS ARE UPHELD FOR FIVE YEARS.

METROPOLITAN WORKS, DIANA PLACE, EUSTON ROAD, LONDON, N.W.

PARIS EXHIBITION, 1878.

THREE MEDALS

AND

HONOURABLE MENTION

HAVE BEEN AWARDED TO

JOSEPH CLIFF & SONS

For their Various Exhibits, amongst which is a

SILVER MEDAL

FOR THEIR

PATENT MACHINE-MADE

RETORTS AND FIRE-BRICKS,

Being the Highest Honour given for this class.

Established

1795.

JOSEPH CLIFF & SONS,

THE ORIGINAL

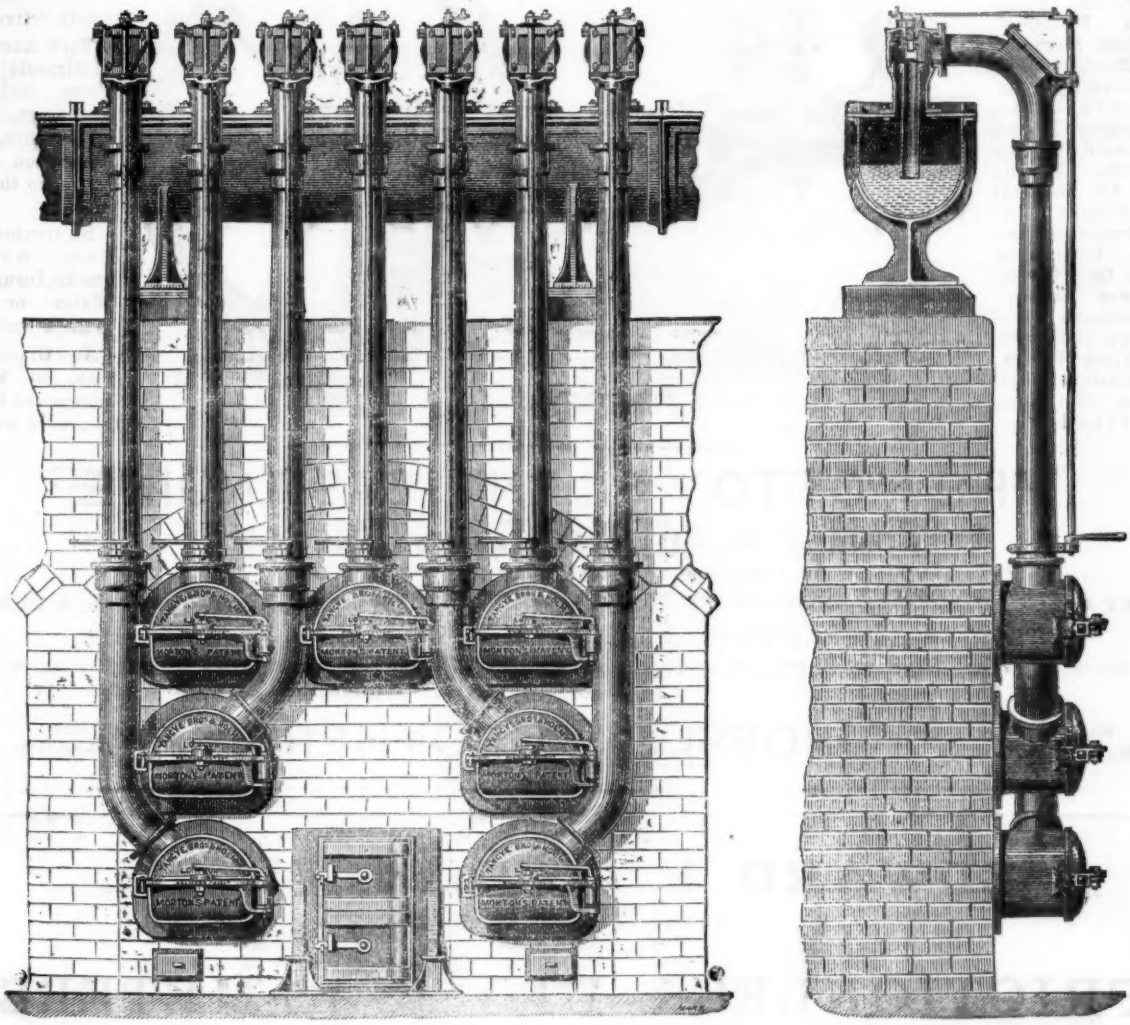
WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N. Liverpool: Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-Made Retorts have now been thoroughly tested, and have proved themselves infinitely superior to those made by hand. At several large works it has been settled, beyond question, that, owing to the compactness and general excellence, more gas is sent to the gasholder from each ton of coal carbonized than is the case with hand-made Retorts.

HOLMAN'S PATENT
NON-PRESSURE VALVULAR SEAL-PIPES
FOR
HYDRAULIC MAINS.



The salient features of the above arrangement are as follows:—

1. The Seal is instantaneously opened and closed from the stage by the stokers.
2. There are only two positions for the actuating lever: one when the Seal is opened during the period of carbonization, the other when it is closed for drawing and charging the retort.
3. The retort can never be blocked, beause the port directing the gas *through* the Seal is always opened, and the port permitting the gas to *pass* the Seal *direct* into the hydraulic main is also open while the retort is at work.
4. The manager and stokers can always see at a glance, by the position of the lever, whether the retort is duly unsealed while carbonizing its charge.
5. There are no extraneous seals, stuffing-boxes, hinges, screws, chains, pulleys, springs, teeth, or other complication belonging to the valves; they are made plain and strong for rough use, and will last many years without renewal.
6. The valve faces are always covered and never separated, hence no foreign matter can put them out of action.
7. They are positive, reliable, interchangeable, free from all the uncertainty of automatic arrangements, and low in price.
8. No extra pipes or connections are required, because the Valvular Seal-pipe is self-contained in the single branch of the ascension-pipe, which stands on the hydraulic main, and is easily accessible by removing an ordinary cover secured by two bolts only.

(238) TWO HUNDRED AND THIRTY-EIGHT HOLMAN'S PATENT VALVULAR SEAL-PIPES are being fitted to the Hydraulic Mains at the Radford Station of the Corporation Gas-Works at Nottingham.

(84) EIGHTY-FOUR more are being fitted to the Mains in the New Retort-House of the Gas-Works at Brentford, and they can be readily applied to existing Hydraulic Mains generally.

They are to be fitted to the Hydraulic Mains of the New Retort-House at the LONDON GAS-WORKS, and at other large stations.

Mr. MORTON writes in the following terms, under date of Feb. 3, 1880:—

"Gentlemen,—I have determined to use your HOLMAN'S PATENT NON-PRESSURE VALVULAR SEAL-PIPES in our new Retort-House. Will you, in the meantime, send me, as soon as you can, four as you are now making them. I expect to hear of a large demand for these Pipes. I like the idea of always maintaining a passage through an ordinary dip."

ESTIMATES for Retort Work, including Mouthpieces fitted with Morton's Patent Self-Sealing Lids and Holman's Self-Sustaining Cross-Bars and Fastenings, Hydraulic Mains and Ascension-Pipes, fitted with Holman's Patent Non-Pressure Valvular Seal-Pipes complete (as per accompanying illustration), will be forwarded to Engineers on receipt of particulars of intended erections, or re-setting of Retorts during the current or ensuing season.

Engineers preparing Specifications will be furnished with Tracings and all necessary data on application.

Sole Makers:

TANGYE BROTHERS AND HOLMAN,
HYDRAULIC AND GAS ENGINEERS,
CORNWALL HOUSE, QUEEN VICTORIA STREET, LONDON, E.C.

London, 1851. New York. 1853. Paris, 1855. London. 1862.

Dublin, 1865. Paris 1867.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters bv the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS.

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

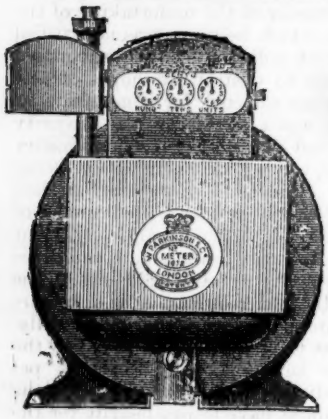
LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS.

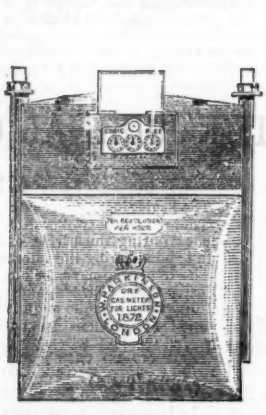
1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON AND CO.

(ESTABLISHED 1816)



WET & DRY METERS,



STATION-METERS & GOVERNORS,

EXHAUSTER REGULATORS,

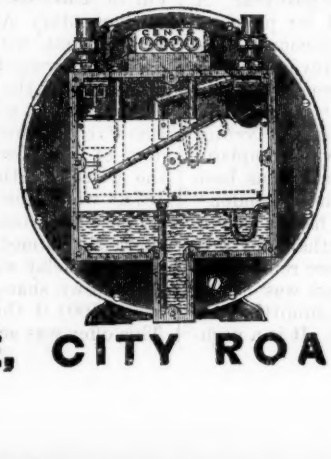
PRESSURE REGISTERS, EXPERIMENTAL APPARATUS, GAUGES, WATER-METERS, &c.

SOLE AGENTS FOR

FOULGER'S PATENT SEAL UNIONS & CUTTING-OFF CAPS.

HUNT'S PATENT IMPROVED COMPENSATING METER.

In this Meter, the action of the measuring-drum is reversed. By this arrangement an improvement is effected in the registration at high speeds, which, in many tests, has not varied from the smallest light to three times the capacity of the meter. It works equally well under all pressures. The range of error between the high and low line much smaller than that allowed by the "Sale of Gas Act."



The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

W. PARKINSON and CO. have made arrangements for the manufacture of these Meters, both in tin and cast-iron cases, and for the alteration of old ones to this principle, which is confidently recommended as possessing every quality that can be desired by Gas Companies, Corporations, or Private Consumers.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

J. S.—*Shall most likely have room for report in next issue.*

R. K. M.—*Not suitable for publication.*

One Anxious.—*You have probably let a little tarry vapour into the purifier, and this has accumulated on the bearing bar, and been fired by the heat generated in the spent lime when air was admitted on opening the purifier-lid.*

New England Association of Gas Engineers.—*We have pleasure in acknowledging the receipt of a copy of the report of the proceedings of this Association, held at Boston last February.*

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, AUGUST 3, 1880.

Circular to Gas Companies.

The possibilities in relation to gas supply which are from time to time, being opened out to us, have received a remarkable development during the past week through the action of the Leeds Gas Committee. As intimated elsewhere, that body have resolved still further to reduce the already low price at which gas is supplied in Leeds, and they will accordingly recommend to the Town Council that the charge throughout the wide area which they supply shall be 1s. 10d. per thousand feet from the 1st. ult.—a reduction of fourpence per thousand feet from the price charged during the past year. A further discount of 2½ per cent. will be allowed for payment within one month of delivery of the half-yearly account. The quality of the Leeds gas would appear to vary inversely with the price, for while a few years ago we had to report frequent complaints, both as to the quality and quantity supplied to the consumers, the price being rather higher than the average of neighbouring towns, there appears to be now no complaint as to the abundance of the supply, and the quality has been raised to seventeen candles, as tested by the "London" burner. Such terms and conditions, we need hardly inform our readers, are more favourable to consumers than any previously recorded, and the case appears the more remarkable when we remember that four years ago the price was 3s. 9d. per thousand feet, and that in 1874 the Gas Committee were accumulating a handsome *deficit* at that figure. It is a peculiarity of the Leeds Gas Committee that they do not wait for the publication of their accounts before determining the prospective price. The Engineer is instructed to prepare an independent estimate of the probable cost for the ensuing year, and upon this the Committee act. We understand that in the estimate so prepared, Mr. Henry Woodall has calculated upon an increased sale of 100 million feet, which is equivalent to nine per cent. The increase last year was at the rate of more than ten per cent., and the anticipation for the current year is therefore not an exaggerated one; indeed, we cannot but consider that such circumstances as those provided by the Leeds Gas Committee will serve as a sufficient stimulus to consumption, and cause the use of gas to be extended to an unusual degree. What such a stimulus amounts to may be illustrated by the fact that the user of gas as a motor in Leeds, paying say £300 for an engine, is placed at least on a par with a consumer in any town where 3s. per thousand feet is charged, supposing the latter to receive his engine as a gift. Especially in a manufacturing town like Leeds, there can be no doubt as to the superiority of the policy there pursued to that of those Corporations who make large profits out of the gas consumers, and hand them over for the benefit of the ordinary ratepayer. In these days of keen competition and small manufacturing profits, it is not at all difficult to conceive a very important influence being exerted upon the fortunes of a town by such a policy, especially as the general introduction of gas-engines is making cheap gas almost synonymous with that most potent instrument for good—cheap fuel. We do not doubt that this action on the part of the Leeds Gas Committee will cause serious inconvenience to those Corporations who desire to continue the pleasant but vicious practice which we have so often condemned, and we shall heartily rejoice to see them following the good lead now set them. If this is generally done, the present conflicting aims being reduced to the simple one of making and supplying gas as well and as cheaply as possible, they will then be able to contend on even terms with Gas Companies for the honour of the foremost place, and the present position of the Leeds undertaking may well encourage them to expect success. It will be generally interesting to know the details of the economies that have enabled the Leeds Gas Committee to effect the considerable and continued reductions in price of the last four years, and we shall be glad, if possible, to lay the same before our readers.

It will be remembered that a quarrel which had long existed between the Corporation of Exeter and the Exeter Gaslight and Coke Company culminated, in the summer of 1878, in a proposal for the transfer of the undertaking of the Company to the Corporation, which, however, was not ratified by the ratepayers, who, on being polled, rejected the proposed bargain by such a majority as to destroy all hopes of any arrangement of the kind being effected for some years at least. The result of the poll was a surprise to the majority of the Town Council, who had run up certain preliminary expenses, usual in such cases, relying on their action being supported by the ratepayers. But, as the event proved, they found themselves in the exceedingly awkward predicament of having to face a bill of costs which the Local Government Board declined to recognize, and which any single ratepayer might, by taking legal action, prevent being paid out of the rates, as having been illegally incurred, leaving it to be surcharged upon the disappointed town councillors personally. We can quite understand that the regret naturally felt by the members of the Council at having failed to carry a pet scheme must have been distressingly intensified by the further reflection that they might have to pay heavily for the mistake into which their zeal had led them. At a recent meeting of the Council, the Finance Committee—having been threatened with proceedings in the Queen's Bench Division of the High Court of Justice if they passed the Town Clerk's bill of £438 6s. 11d., being the amount of his own and the Parliamentary Agent's costs in the matter of the illegal arrangement with the Gas Company—brought the whole question forward for decision by the full Council, and we do not think the action finally taken reflects much credit on the collective wisdom or fairness of that body. In the course of discussion, some reflections were made on the conduct of the Town Clerk for having neglected to ascertain the wishes of the owners and ratepayers until December, 1878, when the decision of the Council had been given in July—the costs being incurred in the interval. The Town Clerk disclaimed having neglected his duty, and explained that the delay was not his fault; but finally offered to give up his own share of the bill of costs (amounting to a little over £100) if the Parliamentary Agent's claim were allowed. This offer was accepted by the Council, a minority still, how-

ever, protesting against any part of the bill being charged on the rates. In this unsatisfactory affair nobody shows to advantage except the Town Clerk, whose surrender was, it must be confessed, an act of weakness. He should have stuck to his bill, as having been incurred by order of the Council, leaving them to meet the legal difficulty as best they might. The Council, on their part, should have had the courage to face the ratepayers, individually or collectively, in defence of proceedings conducted *bonâ fide*, and, as they believed, in the ratepayers interest; and so have ordered payment of the bill, instead of endeavouring to shelter themselves behind the Town Clerk's liberality, or feebleness, as it may equally well be called. But having shown this willingness to victimize their paid officer, and in so doing to lighten their own responsibility, it will be but suitable retribution if, after all, the considerable balance of the bill should be left to be settled among themselves.

The question of the rate of hire of gas-stoves in Leicester is not to be allowed to rest at the point where we left it a few weeks since, when the Chairman of the Gas Committee thought he had finally disposed of it in his speech at a meeting of the Town Council. This time the persons who considered themselves principally aggrieved—some thirty-six gasfitters and ironmongers, who are also ratepayers—have presented a memorial to the Council, asking for some restraint to be imposed on the action of the Gas Committee in letting stoves on hire on terms which not only prevent the local traders from doing any business in such articles, but also fail to repay the Committee for their outlay. The latter is really the more important allegation of the two, although it was probably introduced as a mere make-weight by the framers of the memorial. We have already in these columns expressed our opinion on the general subject, and have nothing to add to it on the present occasion. We hold that no consideration of expediency can warrant a public or private trading corporation in making a heavy profit (or a loss) on accessories necessary to the consumption of the staple commodity which they sell. From neglect of the salutary rule that "every tub should stand on its own bottom," come many and widespread evils. In the case of Leicester, the harm done to the local traders is probably of small extent, since it may safely be assumed that if the ordinary traffic in gas-stoves had been of any importance, the extraordinary action complained of would never have appeared necessary in the opinion of the Gas Committee. But, on the main principle, that action stands condemned by the words of its chief advocate. To charge a rental of ten per cent. on the prime cost of an article which costs five per cent. annually for repairs—thus leaving a bare five per cent. to pay for interest on capital, cost of supervision, and depreciation—is hardly a common-sense proceeding. Yet such is the avowed practice of the Leicester Gas Committee. Whatever may be the advantages the use of gas-stoves can be proved to possess—and we do not for a moment dispute that they are many—they would remain but little affected, as regards the gas consumers, if the Committee were to charge such rent for their use as would leave sufficient margin to cover all possible expenses attending their purchase and maintenance. Giving the Committee credit for their intentions, which are to popularize and extend the use of gas, we still maintain that the way they have chosen for doing it is a wrong one. But the error is not of any magnitude; and, if corrected, the clamour against interfering with private enterprise may be unnoticed, since any spirited tradesman, by offering equally good articles at a suitable discount for cash, may underbid the Committee, without incurring their displeasure, as, in any case, their own ends would be served. A publication, circulated in the town, in which the general management by the present Gas Committee of the valuable property committed to their care is seriously impeached, may perhaps have appeared in connection with the gas-fitters revolt, although the affair of the stoves is only incidentally mentioned in it, and then merely to sustain a bad argument. In this statement we are told that the receipts from gas and meters barely cover the cost of manufacture and distribution of gas, and interest on borrowed money; hence the sole source of profit *available for relief of the rates* is the sale of residuals, which are stated to bring in only £20 on the capital employed per million feet of gas in Leicester; while in Birmingham and Nottingham the returns on the same basis are £27 and £30 respectively. Hence it is argued that it is folly to seek to develop the sale of gas while the profit from residuals is so much below what it ought to be. Now, in the first place, although it is just possible that the Leicester Gas Committee do not make the best of their residuals, no one with any knowledge of the conditions involved would, on the other hand, contend that one gas-works should always realize as much by the sale of residuals as another works in different circumstances. Then, again, to give up all efforts to push the sale of gas by legitimate means because the revenue from it, taken arbitrarily by itself, barely covers the total charges of the establishment which produces it and other things besides, would be the counsel of a lunatic. Has it ever struck the ingenious framers of this argument, who also want to see so much "profit" made out of gas consumers for the benefit of ratepayers, that the best way of helping both classes of the community would be to make them amalgamate as far as possible, by so reducing the price of gas, and helping its general consumption, that the great majority of ratepayers should eventually also be gas consumers? If not, we would commend this as fit food for reflection to them and their fellow-townsmen, with the full assurance that if they will only carry it out, the great question of gas will from thenceforth cease to trouble their minds.

The action taken by the Corporation of Hanley, through their representative in Parliament, of opposing the third reading of the British Gas Bill, was unusual, and therefore invited the very grave objections which were urged against it in the House of Commons. Very rarely indeed has it been found that the many stages through which a Bill has to pass in its process of development into an Act of Parliament have not been sufficient to open up everything in it to which exception need be taken. This being so, although the issue cannot be satisfactory to both sides, the proposition at the last of those stages—usually a purely formal one—to cast aside the previous work of the Houses and their Committees, needs to be supported by arguments of unusual force to save it from emphatic condemnation. The opponents of the British Gaslight Company had been heard in the House of Lords, and the Committee of that House had, while passing the preamble of the Company's Bill, themselves made certain alterations in the clauses, the opponents declining their aid in the consideration of them, lest they should be prevented from opposing the preamble in the Commons. When the Bill reached the Lower House, and before it was referred to a Committee, the Company took exception to the *locus standi* of the Corporation. They maintained before the Court of Referees that their Bill was simply one to enable them to raise further capital, and not to vary the powers or conditions under which they conducted their undertaking, and that the Court had laid down the rule that *locus standi* should not be allowed to opponents of simple money Bills. This view was approved by the Referees, though with some apparent reluctance, and the Bill consequently went through the Commons as an unopposed one. Now, under these circumstances, it is hard to condemn the action of the Hanley Corporation, because it is to us impossible to approve the rule under which they were refused a hearing. With what object does Parliament limit the amount of capital granted to Companies, and so compels their periodical return to ask for more? It has always been held that the purpose was to ensure a revision of their powers from time to time, so that they may be kept up to the scientific and economic standard of the day. It would appear, however, that this view is a mistaken one. If a Company will but be content to stand by its existing regulations—if, for instance, having a limitation of price to a maximum of 5s. per thousand feet, it abstains from offering to reduce that maximum to 4s. per thousand, or with an illuminating standard of twelve candles it does not ask that it be raised to sixteen—its consumers have no right to be heard. If, however, with a desire to act justly by its constituents, such a Company volunteers these improvements, the barrier is removed, and opposition may be offered all along the line. Such a condition of things appears to us only possible until it is examined into. We are sincerely glad that the British Company, after having fought their way to the final stage, have not lost their Bill in the unusual, and, by them, undeserved way proposed. At the same time, the honourable member for Stoke will have done good service to the public, and we believe also to Companies applying to Parliament, if his action should have the effect of drawing the attention of the authorties of the House of Commons to the existing anomaly, and so secure its speedy alteration.

The Corporation of Arbroath have not given entire satisfaction by the manner in which they have disposed of the last year's profits on their gas undertaking, and fixed the selling price of their gas for the current year. They are under no statutory obligation as to the apportionment of the profits, and, as there was a substantial surplus last year, it was hoped that some relief would have been accorded to the consumers, by the Gas Committee making a proper use of

the opportunity for reducing the price of gas to something nearer the average of certain neighbouring towns. But the temptation to figure as benefactors to the ratepayers was too great to be resisted, and consequently, though not without protest in the council chamber and in the local press, it was finally determined to pass over half of the disposable profit in hand to the Town Council, to be devoted in aid of public improvements. As far as arguments go, the advantage was all in favour of the opponents of this proceeding, but the result was apparently a foregone conclusion. Whether the ratepayers will appreciate the boon in such a degree as to compensate the majority of the Council for the discontent which their action is certain to arouse in the gas consumers is an open question. The satisfaction of the former section of the public constitutes an element of a purely negative character. If they do not grumble quite so much as usual after a measure of partial relief, it is as much as can be expected; but the contentment of gas consumers invariably tends to increase the business which they maintain, and should therefore be carefully furthered on all possible occasions. The truth of this doctrine has yet to be recognized by the majority of the Town Council of Arbroath; but it is bound to be accepted in due time, with such powerful local arguments in its favour as have been recently brought forward.

The notified issue of £50,000 of ordinary "A" consolidated stock in The Gaslight and Coke Company, which will be sold by tender on the 26th inst., forms public evidence of another step in the development of this already immense undertaking, and will bring up the total amount of stock and loan capital employed in it to nearly £9,200,000. The authorization of this issue dates from the 14th of February, 1879, and it forms the last portion of the increase of capital then agreed upon. The Company are enabled to pay for the past half year 11 per cent. on their ordinary shares; and if the prices of coal and materials generally remain at their present level, the accounts may be expected to show, in the gross, equally well next year. Exceptional circumstances may, of course, at any time arise to temporarily cloud over the fortunes of the Company; but in spite of promises of a renewal of what meteorologists term, in a different sense, electrical disturbances, it is to be hoped that Stock Exchange "bears" will not have another chance of operating to the disadvantage of gas property generally, and that of the Metropolitan Gas Companies in particular. For the rest, the present is most decidedly a flourishing time for the gas interest, which may be said to stand to-day in a firmer position than ever it did, and this will probably be manifested in a tangible form by the prices which The Gaslight and Coke Company will receive for their new stock.

The communication by "Isca," on the subject of Dr. Schilling's gas generator furnaces, which we published in part last week and finish in the present issue, is one of the most instructive descriptions of the construction and working of one of the best varieties of this class of retort-furnaces which has yet been laid before the public. Dr. Schilling's work is always thorough, and the form in which his statements are presented to English readers by our contributor should render them easy of comprehension by those to whom these furnaces are a novelty. In a special communication, addressed to us personally, for the benefit of his professional brethren in England, Dr. Schilling lays particular stress on the advantages to be gained by the use of steam in the generator. For Newcastle coke he advises the introduction of nearly fifty per cent. of steam by weight; and he also draws attention to the high temperature which he is able to impart to the air used in the second combustion in the setting, by utilizing the waste heat of the spent products of combustion. He states that this can be managed without difficulty, and that the entire arrangement, as used by him at Munich, works very simply and almost automatically. He very courteously expresses his willingness to show his furnace in action, and explain it fully to any one who feels sufficiently interested in the system to visit Munich for the purpose of inspecting it.

THE Alliance and Dublin Consumers Gas Company having invited offers for 800 unallotted 7 per cent. shares in the Company, received tenders for more than four times the number, and it is stated that the Directors have placed the whole of the shares offered at an average premium of £1 12s. 6d. per share. In several cases the premium paid was £1 15s.

SALE OF GAS SHARES AT BEDFORD.—On Friday, the 23rd ult., Messrs. Usher and Antony offered for sale three £100 original shares in the Bedford Gas Company, two of which realized £170 each, and the third £175. The following stock in the Company was also disposed of:—£150 worth of original stock fetched £262 10s., a second lot realizing £270; £187 10s. of original stock sold for £337 10s.; £120 new stock, £162; £151 ditto, £211 8s. At the same time five original £10 shares in the Baldock Gas Company were sold at par.

Water and Sanitary Notes.

POSSIBLY we may hear something to-day as to the report of the Select Committee on the London Water Supply. The Committee met last Tuesday to consider their report, and then adjourned until to-day. Conjecture is rife as to the shape that it will assume, and the extent to which it will go. As the evidence before the Committee deals only with the provisional agreements, it might be thought the report should be limited in like manner. Even then a document of some length would be likely to appear, as any amount of detail might be indulged in concerning the value of the undertakings. The Committee have extensive materials for this purpose. Lieut.-Col. Bolton has handed in a series of tables, including estimates of the future annual working expenses for each million gallons of water supplied, based upon the results of the past nine years. An allowance is suggested for interest on capital outlay at four per cent. per annum, and for wear and tear of plant at one and an eighth per cent. per annum. These average annual outlays are contrasted with the average water-rents, showing the estimated surplus revenue after making what is considered to be adequate provision for working expenses and interest in the case of the district supplied by each Company, and also over the whole of the area supplied by all the Companies. The results go to prove "that the cost of the work of the future, if esti-"mated for on the excessive expenditure of the past, will "give a considerable surplus of income over the outgoings, "even if calculated out on the average working expenses and "rentals of the past nine years." Another document connected with the inquiry consists of a paper handed in by Sir Theodore Martin, and bearing the date of Tuesday last. This comprises copies of the several agreements entered into by the late Mr. E. J. Smith in treaty with the Water Companies. The great feature in regard to these agreements is the value set on the undertakings, and of this the public have already heard a good deal, though possibly—as Sir Edmund Beckett has signified—few people really understand the matter.

"Father Jean," in the columns of the *Echo*, continues to utter his deep dissatisfaction with all that appertains to the Water Supply of the Metropolis. The recent inquiry by no means satisfies him. "No case for the ratepayers was ever "presented with less force or on weaker lines." So he declares, and then he adds: "The abuse of Mr. Smith was "childish. The tribute paid to him by the Companies "Counsel was complete, and deserved." This is good, and we are only surprised that "Father Jean" should say it. But he cannot cease to lament what he considers to have been the absolute neglect of the interests of the public as connected with this inquiry. "Can any ratepayer," he asks, "pretend "that his interests were represented?" "An outburst of "indignation" is invoked. Sir J. M'Garel Hogg is said to have enjoyed "a grand opportunity," and to have "failed "miserably." "What is now to be done?" asks "Father "Jean." What this doughty champion would do if he had the "grand opportunity," is shown by his suggestion that "the business of a Water Company is akin to that of an "ordinary trader whose business is compulsorily acquired," and that "in no case of a going concern has more than five "years purchase been paid to a trader for his property or his "unearned increment of future profits." "No evidence was "presented on this head," we are told. It is a pity that "Father Jean" was not sent for, to prove the justice of paying thirty-five pounds down as an equivalent for one hundred pounds stock yielding a dividend of seven per cent. "Father "Jean," we may observe, shows a marked affection for the Metropolitan Board, and an intense dislike towards the Corporation of the City. He denounces the conduct of the Government in accepting invitations to civic banquets. "The persistence in the association with the old, corrupt, "unreformed Corporation is an insult to the rest of the "Metropolis," and Mr. Gladstone and the Ministry are told that they "are expected to realize this state of public "opinion." It occurs to us to ask whether "Father Jean" ever tasted turtle soup at the Mansion House? Has he been unaccountably overlooked?

The latest programme of London Municipal Reform, as laid down by Mr. James Beal and his friends, proposes some rather odd things, including a cessation in the bestowal of titles and dignities upon the Civic Authorities, until the day when the Local Government of the Metropolis is finally settled. In the meantime, also, the Metropolitan Board is to be left to deal with the Water Question as it best can, the present temporary agreements for purchase being annulled. Municipal Reform is thus to come first, and the Water Ques-

tion next. "Father Jean" and Mr. James Beal seem agreed on this point, the former saying, "No question can be settled "in the Londoner's interest until the House, the Ministry, "and Committees understand that the sole remedy in water "or gas, or reduced expenditure, is the creation of a Munici- "pality for London."

The policy of the Dublin Corporation during the present session of Parliament, in reference to the Water Supply of Rathmines and Rathgar, has possibly damaged what might be a fair view of the main question. The authorities of Rathmines and Rathgar have been seeking to obtain an independent water supply at a cost of £150,000. It is not unlikely that the Boundary Commissioners will shortly recommend that these two places shall be included in the city of Dublin, and hence it is argued by the Corporation that the proposal to expend a large sum of money for an independent supply of water is a wasteful and injudicious scheme. As it is not quite certain that the township will be included in the city, it was proposed in the House of Commons last Tuesday that the operation of the Rathmines Water Bill should be suspended for twelve months, so as to await the report of the Boundary Commissioners. The Bill had passed the Lords, and was then awaiting its third reading in the Commons. After a brisk debate the House divided, and the suspensory clause was rejected by a large majority. The Corporation of Dublin need not wonder that Parliament should pass the Rathmines Bill, seeing that in 1874 the Corporation deprived that township of its right to a share in the city supply. So thoroughly had the Corporation severed Rathmines from the Dublin Water Supply, that the Commons Committee refused the Corporation *locus standi* against the present Bill. To get the township cut off from all right to the Vartry water, and then to come forward to prevent them from obtaining a water supply of their own, was not the way to gain the support of Parliament.

A species of conglomerate deputation—comprising representatives of the Fisheries Preservation Association, the Sanitary Institute of Great Britain, the Association for Preserving the Rivers and Lochs of Scotland, the Fishery Boards of the Severn, the Trent, and the Wye, the Rivers Purification Association, and the Manchester Anglers Association—waited on the President of the Local Government Board last Tuesday, introduced by the Duke of Buccleuch. The deputation came to submit for the consideration of Her Majesty's Government, whether the time had not arrived for largely amending the Rivers Pollution Act of 1876, so as to render the statute more effective. Lord Ebury, Lord Denman, Viscount Melville, Lord Elibank, Sir Antonio Brady, and other notabilities, were among the parties thus coming forward. It was urged that the Act in its present form was little else than a dead letter, and the rivers and streams were going from bad to worse. "Some short and summary mode "of dealing with the matter" was demanded, and certain amendments in the law were set forth. Mr. Dodson replied that he had "the greatest pleasure" in seeing so large and influential a deputation; but he had the pleasure, a short time ago, of receiving a deputation "at least as large, and "also very influential," complaining of the stringency of the Act, and asking for some relief. All the Government could do was to reconcile conflicting interests as far as possible, and when the time came for doing something, or thinking about it, the observations made by the deputation would receive consideration. Having obtained this kind of answer, it only remained for the deputation to thank Mr. Dodson and withdraw, which was done. The subject is not an easy one to deal with, and it is to be feared that little progress is being made in purifying the streams by virtue of the Act of 1876. If the manufacturers cry out, we presume the law is not quite dead; and if the opposite parties also complain, we must conclude that the Act is a moderate one.

Signs are given of a fresh agitation concerning the effect of the Metropolitan main drainage outfalls on the Thames. The Woolwich Local Board recently addressed a letter to the Metropolitan Board, asking for immediate attention to be given to "the present filthy condition of the Thames," which is said to be endangering the health of the inhabitants of Woolwich and its neighbourhood. It is stated that at high water the river is black, emitting a most offensive odour, and that sewage matter can be seen floating on the surface. The cause assigned for this state of things seems to be something other than the regular and proper action of the outfalls. It is alleged that the sluices are opened before the flow of the tide has ceased, instead of after the commencement of the ebb. Hence a portion of the sewage is carried upward before it begins its downward course. This premature opening of the sluices is said to be contrary to the orders given to the parties in charge. We are disposed to fear that the late heavy rains have so overcharged the sewers that it has been found necessary to open the sluices before the proper time, and hence the nuisance has arisen as described. If any other explanation can be offered, we shall be glad to hear of it. We hope that in some way the evil can be shown to be temporary only in its character.

The disposal of the sewage of Derby was, a short time since, the subject of an able and extensive report from Mr. Clement Dunscombe, C.E., who has recommended the Town Council to alter the present system prevailing in the locality, so as to turn the whole of the excreta into the sewers, and make Derby a completely water-closeted town. He proposes the construction of intercepting sewers, and the adoption of an irrigation farm of nine hundred acres. If the land cannot be obtained on reasonable terms, he suggests the employment of intermittent downward filtration, for which one-third of the former area would be sufficient. Or, he says, a scheme of combined precipitation and filtration might be carried out. Other plans are also discussed, and the Town Council will now have to consider what they will do.

On the invitation of the Native Guano Company, a large and distinguished party visited the sewage works at Aylesbury a few days ago, where they witnessed the application of the A. B. C. process. The town contains about eight thousand inhabitants, and the sewage amounts to three hundred thousand gallons daily, which is made to yield nine or ten tons of "native guano" per week, selling at £3 10s. per ton. Five members of Parliament were present, and several scientific persons, besides numerous representatives of local authorities, both at home and abroad. Mr. Clare Sewell Read expressed his opinion that the treatment of sewage was a science which had made great advance, and while he believed irrigation was the best mode of getting rid of sewage on some soils, he considered that the A. B. C. process would be of considerable advantage to a large number of towns, particularly in the North of England.

The proposal to transfer the Royal Mint from Tower Hill to the Victoria Embankment is taking a very practical shape, and we may possibly hear some revival of the objections to that project, on the ground that the vapours from the chimneys of the Mint will be deleterious and annoying. But according to a report drawn up by Mr. Keates, the Consulting Chemist of the Metropolitan Board of Works, some few years ago, no mischief of this kind is to be apprehended. The proposed site belongs to the Corporation, and consists of about three acres, valued at a quarter of a million sterling.

It is announced that, at the meeting of the Board of Directors of the South Staffordshire Water-Works Company, last Thursday, it was resolved, subject to the examination of the accounts by the Auditors, to recommend to the Proprietors the declaration of a dividend for the past half year, on the ordinary stock, at the rate of 3½ per cent. per annum, less income-tax. At the corresponding period last year the dividend declared was 3 per cent.

Kirkcaldy Gaslight Company.—The fiftieth annual meeting of this Company was held on Wednesday last—Mr. Nelson, Chairman of the Board, presiding. From the report of the Directors it appeared that, although circumstances as regards trade in general were adverse, the Company had continued to prosper. The Directors had made considerable additions to their mains, which now extend to upwards of 25 miles. The demand for gas had increased, this increase last year amounting to about 1¼ million cubic feet. The working during the past twelve months had produced a profit to the Company which enabled them not only to pay the usual dividend, but to make a still further reduction in the price of gas, which was reduced last year from 4s. to 3s. 9d., and is now to be reduced to 3s. 6½d. per 1000 cubic feet. On the motion of Mr. Gibb, seconded by Bailie Hendry, the report was unanimously adopted; and the following gentlemen were elected Directors in the room of those retiring:—Messrs. Nelson, Stark, Tod, Ness, Whyte, and Brown. The services of the Clerk and Treasurer (Mr. Spears), and of the Company's Engineer (Mr. A. MacPherson), having been duly acknowledged, a vote of thanks to the Chairman brought the meeting to a close.

New Companies Registered.—The following new Companies have recently been registered:—The Blyth and Cowpen Gaslight Company, Limited, was incorporated on the 16th ult. with a capital of £10,000, in £5 shares, to acquire the undertaking and property of the Blyth and Cowpen Gaslight Company, in the county of Northumberland.—The Henley-on-Thames Water Company, Limited, was registered on the 15th ult., with a capital of £10,000, in £10 shares, for the purpose of supplying Henley-on-Thames and the district with pure softened water. Among the first subscribers we notice the name of Mr. Jabez Church, C.E. —The Westerham Water-Works Company, Limited, was registered on the 19th ult., with a capital of £2500, in £5 shares, for providing the town of Westerham, in Kent, with a supply of water.—The Ilminster Gaslight, Coal, and Coke Company, Limited, was registered on the 22nd ult., with a capital of £3000, in £5 shares, to carry on the ordinary business of a gas, coal, and coke company.—The House Sanitary Appliances and Inspection Company was also registered on the 22nd ult., with a capital of £25,000, in £5 shares, to carry on the business of sanitary engineers and inspectors, also to advise and execute sanitary works in connection with dwelling-houses, hospitals, asylums, public institutions, schools, factories, workshops, offices, lands, buildings, and property. Among the first subscribers are Dr. Alfred Carpenter, of Croydon; Mr. J. Bailey Denton, C.E.; and Mr. Ernest Hart.

Communicated Article.

THE IMPROVED GENERATOR FURNACES AT THE MUNICH GAS-WORKS.

By "Isca."

(*Concluded from p. 135.*)

I now come to an extremely interesting part of Dr. Schilling's paper, in which he proceeds to discuss the nature and value of the already recorded results from a theoretic point of view. According to his statement, the coke in the generator is incompletely consumed, producing CO instead of CO_2; though it would appear, from remarks in his previous communication, that part of it at least is perfectly consumed at first, and the resultant CO_2 is subsequently reduced to CO in its passage through the glowing contents of the upper portion of the generator. However, it may be assumed that as far as the production of actual heating power is concerned, the whole of the carbon of the fuel is converted into CO. The heat evolved in this conversion is partly sent forward as sensible heat into the retort-setting, part of it is used for decomposing the steam introduced into the generator, and a fraction is lost by conduction and radiation from the generator walls.

The total quantity of heat produced in the generator may be calculated from the composition of the effluent gases. On the basis of the composition of these gases, already recorded, it will be seen that, as expressed in the centigrade notation used by Dr. Schilling (which, from its convenience in analysis, and for purposes of comparison *inter se*, I may as well retain for this part of the investigation), one cubic mètre of heating gas gives by formation—

9·1 per cent. of CO_2	=	·091 × 4334	=	394 calories.
19·8 „ „ CO	=	·198 × 1327	=	263 „
Total				657 calories.

(1 calorie = 1 kilo. of water raised 1° C. = 3·968 English units of heat.) The heating gas contains 28·9 per cent. of carbon gases, or in 1 cubic mètre ·289 × ·5364 = ·155 kilo. of carbon. The carbon in one cubic mètre of this gas would, with complete combustion, develop ·155 × 8080 = 1252 calories. Hence in gasification there is produced in the generator ·525, or 52·5 per cent. of the total energy which the carbon is capable of developing. We must not overlook the fact that the coke being supplied to the generator red hot, a certain amount of heat from this source must be added to the quantity calculated as above. Taking the temperature of the coke as 1000° C. (1830° Fahr.), and its specific heat at 0·204° C., this additional quantity of heat will be ·155 × 1000 × ·204 = 32 calories, which consequently gives 657 + 32 = 689 calories as the total quantity of heat produced in, or brought into the generator per cubic mètre of gas evolved. Part of this passes into the setting as sensible heat. The average temperature of the gases on leaving the generator is 1100° C. (2010° Fahr.) In order to raise their temperature 1° C., there would be required—

1 cubic mètre CO, H, and N	=	·307	calories.
1 „ CO_2 „	=	·427	„

The heat capacity of 1 cubic mètre of these gases is—

CO + H + N	=	90·9 per cent.	=	·909 × ·307 = ·27906
CO_2		9·1 „	=	·091 × ·427 = ·03857
Total				·31763

In the gases at the temperature stated there are consequently ·31763 × 1100 = 349 calories. Another part of the heat is used for decomposing the steam. In calculating this portion, two circumstances must be borne in mind. (1) The whole of the hydrogen contained in the heating gas is not derived from the steam admitted into the generator—a small portion of it comes from the coke itself, which has not entirely lost volatile matter. By the use of a method of computation due to Dr. Bunte, an addition of 2·5 per cent. of hydrogen to the previously stated 28·9 per cent. of carbon gases must be made in order to fully represent the gaseous products of Saar coke. Deducting this proportion of hydrogen from the total of 13·9 per cent. present in the heating gas, the remaining 11·4 per cent. is to be considered as hydrogen derived from the decomposition of water. (2) The steam in the generator has acquired its latent heat before admission. The heat absorbed by it must, therefore, not be considered as the sum of the requirements of vaporization and decomposition, but of decomposition of hydrogen from steam only.

Taking these two circumstances into consideration, the heat absorbed in the decomposition of the necessary steam is ·114 × 2655 = 303 calories. Thus, of the total quantity of heat developed in the generator by the combustion of carbon (*i.e.*, 689 calories), there are traceable as—

	Calories.	Per Cent.
Sensible heat in gases at 1100° C.	349	= 51
Absorbed in decomposition of water (still present in the form of hydrogen) . . .	303	= 44
Lost by conduction and radiation	37	= 5
Total	689	100

The results formerly obtained were as follows:—

	Calories.	Per Cent.
Disposable heat in the gases	324	= 43
Absorbed in decomposition of water . . .	305	= 40
Lost by conduction and radiation	131	= 17
Total	760	= 100

The useful duty of the generator has, therefore, been materially increased. *The total loss of heat from the generator is nearly balanced by the gain from the use of hot coke.*

So much for the first stage of the process. Going on now to the second stage, which includes the final combustion of the hot generator gases in the retort-setting by the admission of hot air, Dr. Schilling gives the following tabular statement of the action which takes place:—

One Cubic Mètre of the Gases.	Air. Oxygen.	Air. Nitrogen.	Products of Combustion.		
CO_2 ·091			·091 CO_2		
CO ·198	·099	·635	·198 CO	·289 CO_2	18·6 CO_2
H ·139	·070		·139 H_2O	·139 H_2O	
N ·572			1·207 N		
1·000					
Excess of air, ·018	·018	·067	·018 O ·067 N	·018 O 1·274 N	1·2 O 80·2 N
	·187 O	·702 N		1·720	100·0

Air, ·889 cubic mètre.

In this table the surplus air found in the furnace gases is taken into consideration. As will be noticed, ·889 cubic mètre of air is added to the heating gas in order to produce the observed average composition of the furnace gas. The actual surplus air is, therefore, about 10 per cent., which is a remarkably good result for practical working, and, perhaps, as near theoretic perfection as can be looked for. It is interesting to note the proportion of air which enters through the generator and after regeneration respectively. The heating gases contain 57·2 per cent. of nitrogen; therefore, ·572 × 1·266 = ·724 cubic mètre of air enters the generator per cubic mètre of heating gas. The total air supply is thus divided as follows:—

Through the generator passes	·724 c.m.	per mètre of gas, or	45 p.ct.
„ regenerator „	·889	„ „	55
Total	1·613		100 p. ct.

The quantity and intensity of the heating effect produced in the retort-setting by the combustion of the gaseousfuel are thus determined. The combustible matters contained in 1 cubic mètre of the gas are, by analysis, ·198 CO + ·139 H = ·337 cubic mètre; by the complete combustion of which the following effect is produced:—

(·198 × 3000) + (·139 × 2655)	= 963 calories
The gas being at 1100° C. contains	349 „
The heated air from the regenerator, being at 1090° C., contains (1090 × ·889 × ·307) . .	= 298 „
Total heating power in the combustion products	1610 calories.

This power being applied to the products of combustion gives to them an initial temperature to be determined thus—

·289 C O	=	·289	×	·427	= ·123403
·139 H_2O	=	·139	×	·382	= ·053098
1·292 O + N	=	1·292	×	·307	= ·396644
1·720 cubic mètres					= ·573145

specific heat of the mixture, and 1610 ÷ ·573145 = 2809° C. (5059·4° Fahr.) is the initial temperature obtained. The theoretic basis on which this computation for the initial temperature rests, is the supposition that the combustion takes place instantly and completely upon contact of the gas with air; but practically the combustion is gradual, the contact of gas and air taking place by degrees and in all parts of the setting. This is of advantage in maintaining an equable temperature throughout the setting. As no combustible gases remain in the smoke flues, the combustion (though gradual) is perfect in the space designed for its action.

We may now proceed to determine how much of the disposable heat is actually used in the setting itself. The furnace gases, as we have seen, leave the setting at an average temperature of 1250° C. (2280° Fahr.). With the same specific heat as before, these gases, therefore, take away to the regenerator 1250 × ·573145 = 716 calories, and consequently there remain in the setting 1610 − 716 = 894 calories. And as it is calculated that 1 kilo. of carbon produces 6·45 cubic mètres of heating gases, and it has been found that 894 calories are used in the setting for every cubic mètre of gas employed, the quantity of heat now utilized in the setting is 894 × 6·45 = 5666 calories for every kilo. of carbon that is consumed (or 10,380 English units per lb.), which is an increase of very nearly 30 per cent. over that formerly realized in the first generators. This improvement is due partly to there being no extra expenditure of fuel for raising steam, which formerly required ·0159 kilo. of carbon per cubic mètre of gas, and also to the regenerating system being more perfect than it was, the air being heated now to 1090° C. instead of as formerly to 600° C. The practical expression of the improvement is in the saving of fuel. The former generator consumed 1296 kilos. of coke in 24 hours, whereas the improved one only consumes 953 kilos., which shows a saving of 36 per cent. Formerly, 17·67 kilos. of coke were required in carbonizing 100 kilos. of coal, but now only 14 kilos. are used, showing a reduction of 26·2 per cent. Supposing that a ton of coal produces 13 cwt. of coke, this is equivalent to a consumption for fuel of 21·5 per cent. of the total quantity of coke produced, according to our usual way of reckoning, which, however, is not so convenient or comprehensive as the German plan of estimating the coke in relation to the actual work it performs.

Finally, the work done in the regenerator remains to be calculated. Of the total heat developed by the combustion of the heating gases in the retort-setting—*i.e.*, 1610 calories—the smoke gases, leaving at 1250° C., carry off 760 calories in every cubic mètre. In heating the air to 1090° C., 298 calories are regained, and in the production of steam one cubic mètre of these gases also gives up ·114 × 345 = 39 calories as useful work; hence 298 + 39 = 337 calories of work are extracted from the waste heat in the regenerator, leaving the amount lost by the chimney 379 calories only. If the air, instead of being heated in the regenerator, were admitted into the setting at 0° C., the generator gases would yield 963 + 349 = 1312 calories, and the intensity of combustion would be 1312 ÷ ·573 = 2290° C. instead of 2809° C. The process of regeneration, therefore, increases the temperature 519° C., or nearly 23 per cent. Formerly the regeneration only produced an increase of 14·6 per cent.

Let me recapitulate in tabular form the principal facts which have been mentioned.:—

Duty derived from One Cubic Mètre of Generator Gases.

	Calories.
Developed in the generator	657
Add for hot coke	32
	689
Deduct for decomposition of steam	303
Lost by radiation and conduction	37
	340
	349
Developed by complete combustion of generator gases in retort-setting	963
Add for air supplied at 1090° C.	298
Total disposable heat	1610
Disposed of as follows:—	
Heat used and lost in retort-setting	894
Recovered in regenerator by heating air	298
Recovered in regenerator by production of steam	39
Lost by chimney	379
Total	1610

Referring the whole to the unit of 1 kilo. of carbon, the difference between the new and old generators is as follows:—

	At present. Calories.	Formerly. Calories.
Sensible heat passed from generator into retort-setting	2251	1855
Produced by combustion of gases	6211	5395
Total heat in setting	8462	7250
Which is thus disposed of—		
	Calories.	Calories.
Used in carbonizing, including loss	5766	4438
Used in production of steam	252	—
Lost by chimney	2444	2812
Total as above	8462	7250

The quantity of heat used in the setting per 24 hours is thus—

At present . . . . . 953 × 5766 = 5,494,998 calories.
Formerly . . . . . 1296 × 4438 = 5,751,648 „

Dividing this quantity by the weight of coal carbonized, we obtain the quantity of heat utilized in carbonizing 1 kilo. of coal thus: 5,494,998 ÷ 6887 = 798 calories, as compared with 784 calories formerly used. So that, although the gross fuel consumption is less, the coal carbonized really receives more heat than before. Converted into English units, we see, therefore, that Dr. Schilling finds it necessary to provide 1439·3 units of heat for carbonizing 1 lb. of coal, including waste, but exclusive of the proportion necessarily lost by the chimney.

In a note to his communication, Dr. Schilling states that since the period for which the above data were compiled the generators have been working with even greater economy of fuel. Thus, from Feb. 20 to Feb. 27, the consumption of coke per day was 939 kilos., and from Feb. 29 to March 5 the consumption decreased to 909 kilos. per day. Taking the coal carbonized at the same weight as before, this latter consumption is equivalent to carbonizing 7·6 tons of coal with 1 ton of coke—a result which Dr. Schilling may well consider worth recording.

Lighting Huelva with Gas.—Some time ago a Company was formed in Glasgow for the purpose of working a concession obtained from the Municipality of Huelva of the exclusive right to light the town with gas, and tenders for the erection of the works were advertised for. The successful Contractors—Messrs. Laidlaw, Sons, and Caine—have just completed the works, the official inauguration of which took place on the evening of the 15th ult.

Teignmouth Local Board Gas Supply.—On Tuesday, the 27th ult., an inquiry was held at Teignmouth, by Mr. R. Morgan, C.E., one of the Local Government Board Inspectors, with respect to an application from the Local Board for powers to borrow £2500 for extending the gas-works. During the last ten years the gas supply of Teignmouth has doubled, and the proposed extension is necessary in order to keep the town properly supplied. It was stated that the Board had worked their plant up to its fullest capacity, and now wanted the amount asked for to enable them to meet the town's requirements. There was no opposition to the application.

Correspondence.

[*We do not hold ourselves responsible for the opinions expressed by Correspondents.*]

MR. METHVEN'S TEST FOR ILLUMINATING POWER.

Sir,—In reply to Mr. Hartley's letter in your issue of the 20th ult., I am under the impression, upon the reading of Mr. Methven's paper in 1878, that the principle of the test is an aperture (or slice) which admits a pencil of light to pass and fall on the centre of the photometer disc, the pencil of light being equal to the light which passes from two standard candles, each consuming 120 grains of sperm per hour. I presume Mr. Hartley does not dispute the ability to find such an aperture, but he disputes the flame from which that pencil of light passes.

The slice of flame, or pencil of light, which passed through the aperture in my experiments, was equal to the light which passes from two candles, each consuming 120 grains of sperm per hour. With a 3-inch flame consuming at the rate of 5 cubic feet per hour, through a 15-hole Argand with a 7-inch by 2-inch chimney, I found the average of ten observations equal to 8·25 of the double candles; and the pencil of light which passed from the 3-inch flame consuming 5 cubic feet per hour, through a 15-hole Argand with a 7-inch by 2-inch chimney, against the opposing 3-inch flame of the same gas, consuming 5 cubic feet per hour through a 15-hole Argand with a 7-inch by 2-inch chimney. I also found the average of ten observations equal to 8·28 pencils of light. Therefore the gas against candles equalled 16·50 candles, and the gas-light against a pencil of light from the same gas equalled 16·56 candles. The pencil of light and the candles are thus nearly equal.

The candle is a common standard to the British gas consumer; but I submit Mr. Hartley is in error by opposing the light of it to the slice or pencil of light developed in a gas burner.

In reply to Mr. Hartley's question—"Are my experiments on the same gas but different heights of flame?"—I may say that they are; and they confirm facts recorded by Mr. Hartley in the Journal of Aug. 20, 1878, page 272, where he said: "If the zone of maximum luminosity be higher in one flame than in another, it follows, as it appears to me, that there must be a difference in the total values, even as there are differences in the parts. Hence I dispute that it can be literally true that slices (so to speak) cut out of the flames of different gases at a fixed distance between apex and base, can be equal in lighting power."

It is a remarkable fact that gentlemen proposing new standards as substitutes for candles because of their irregularities, do not challenge the abuse of the candles in the authorized box photometer: The temperature; the unequal draught towards the burner; and the shifting of the candles instead of the disc. These are points on behalf of the candle which demand consideration; and, after these abuses are rectified, the proper use of the candle may be gracefully considered.

July 31, 1880. W. Lyon.

MR. LEWIS T. WRIGHT ON MR. NIVEN'S PAPER ON CORRECTIONS FOR TEMPERATURE AND PRESSURE.

Sir,—I observe in the Journal of the 13th inst. a letter from Mr. Lewis T. Wright relating to my paper on barometric and thermometric calculations. Its object was undoubtedly to give me instruction, and, of course, I should feel grateful. But between assertion and proof there is a chasm that can only be bridged by fact. Whether that fact has been produced I shall now consider, and in order that justice may be done, the paragraphs criticized shall be quoted.

Well, here is the argument brought forward with the view of proving my ignorance: The formulæ for dry and damp gases are based upon the conception of absolute temperature; but Mr. Niven has no idea of absolute temperature; therefore he has no idea of the formulæ. This argument would be valid if the premisses were granted, but I do not grant them. Of course Mr. Wright might say, as an evasion, that he never adduced such an argument. Probably not; but a logician pays as much attention to what is implied as to what is expressed, and if this argument be not running through his letter, then his letter should never have been written. I pass by his description of an air thermometer, only remarking that the disadvantage of such an instrument is that we cannot judge of its index of temperature unless we take note of the barometer at the same time and place.

Mr. Wright says the law of pressure is: "The volume of a portion of gas varies inversely as the pressure, temperature being constant." The law for temperature is: "The volume of a gas under constant pressure expands when raised from the freezing to the boiling temperature, by the same fraction of itself, whatever be the nature of the gas." Now, a law should always be stated clearly and distinctly, if for instruction. To speak of "a portion of gas" conveys the idea of part, in the sense of partial, but the proposition is meant to be universal in its application to gas; wherefore the law of Boyle or Mariotte should be expressed thus: The volume occupied by a gas varies inversely as the pressure, temperature being constant. The second law is indefinite, for it is said that the volume expands by the same fraction of itself, and yet there is no mention of the condition of this fractional expansion. The law of Charles or of Gay-Lussac should be expressed thus: The volume of a gas when raised from 0° C. to 100° C. increases for each degree centigrade by the same fraction of its volume at 0° C., whatever be the nature of the gas, pressure being constant.

Mr. Wright proceeds to absolute temperature as follows:—"Taking freezing point at 32° (1), and boiling point at 212° (1·366), find the temperature expressed at the bottom of the tube by continuing the Fahrenheit scale to that point. A simple calculation will show that it would be − 460° Fahr. Let us shift the zero to the bottom of the tube and scale upwards on the Fahrenheit system, and the freezing point will consequently be on the new scale + 492. Temperature expressed on this scale is termed by scientific men absolute temperature." Such is the glorious idea of absolute temperature! But to speak of the temperature expressed "at the bottom of the tube," and shifting "the zero to the bottom of the tube," conveys no intelligible idea to persons who do not know anything of the subject; and those who do must supply from their knowledge what is required to give them a clear and distinct

idea. I will therefore give the explanation of absolute temperature thus: Suppose the horizontal section of the tube of the air thermometer be 1 square inch, then if at a temperature of 0° C. the air in the tube stand at 30 inches, at 273° C. it will stand at 60 inches, or double; for 1-273rd is increased for every degree centigrade from zero. Again, suppose the temperature, instead of increasing above zero, to decrease below it until it became − 273° C., then if the air in the tube decreased by the same fraction of its volume at 0° C. for each degree centigrade as the temperature was lowered, the air in the tube would be reduced to zero, and − 273° C. at the bottom of the tube would be called the *absolute zero point* of the air thermometer; and temperatures reckoned from this point are called *absolute temperatures*. But − 273° C. is equal to − 460° F., and 492° below 32° F. is 460° below zero F., or − 460° F. I may state that Sir W. Thomson and others consider that a body is absolutely deprived of all heat at about − 270° C., which is nearly the absolute zero point of the air thermometer. I think that the conception of absolute temperature is now understood, so that he who runs may read. Mr. Wright thinks I am puzzled as to how the number 460 in the formula is obtained. If he thinks that, because − 460° Fahr. is the absolute zero point, the factor 460 is based on the conception of absolute temperature, then the puzzle is with himself; but I shall enlighten him before the close of this letter. At this stage I have contributed material to answer the minor premiss of his argument to prove my ignorance—viz., that I had no idea of absolute temperature. I respectfully submit that I have disproved that premiss, and by my mode of denial I have implied the affirmation that Mr. Wright himself had no clear idea of absolute temperature.

To proceed with my analytical criticism. The experimental laws relating to volume, temperature, and pressure are all important for us to know. The law of Boyle assumes temperature to be constant; the law of Gay-Lussac assumes pressure to be constant; and another law assumes the volume to be constant. The last law may be expressed thus: The pressure of a gas increases uniformly with the temperature, volume being constant. The conception of absolute temperature simplifies these three laws into an equation. Mr. Wright has attempted an equation, and while he has stated correctly the data, still the symbols completely puzzle him. He says: "Let V, P, T, be the observed volume, pressure, and temperature on the absolute scale, and V° the volume at standard pressure P°, and standard temperature T° on absolute scale" (I now leave him for a moment), then it will follow that—

$$V\,P\,T^\circ = V^\circ\,P^\circ\,T$$

$$\therefore\ V^\circ = V\,\frac{P}{P^\circ}\,\frac{T^\circ}{T}$$

But T and P° being standard temperature and pressure, the improper fraction $\frac{T^\circ}{P^\circ}$ is constant. If $\frac{1}{480}$ were the coefficient of expansion, the ratio $\frac{T^\circ}{P^\circ}$ would be—

$$\frac{480 + 60 - 32}{30} = \frac{508}{30} = 16{\cdot}933.$$

If $\frac{1}{492}$ were the coefficient, the ratio $\frac{T^\circ}{P^\circ}$ would be—

$$\frac{492 + 60 - 32}{30} = \frac{520}{30} = 17{\cdot}333.$$

Wherefore for dry gases the formula is—

$$V^\circ = \frac{17{\cdot}333\ (V\,P)}{T}$$

Mr. Wright says the formula for dry gases is $\frac{V\,P\,17{\cdot}333}{T}$. Of course we know what he means; but such a negligence in manipulating equations does not tend to precision. Another instance of his carelessness (of course had he been in my position he would have said not carelessness, but ignorance) is the final form of his formula—

$$V^\circ = V\,\frac{P}{P^\circ}\ \frac{T^\circ}{T}$$

Mr. Wright does not here show how the last term is connected, because we know we mentally contribute the "into." He should have had it either as in my form of it, or put a × between the terms. But I am beginning to doubt if, after all, carelessness explains the following expressions:—

$$V^\circ = V\,\frac{P\ 520}{T\ 30 - {\cdot}5178} = V\,\frac{P}{T}\,17{\cdot}64$$

This equation as it stands is not true. How Mr. Wright could have penned the middle expression is very strange. If he sees nothing wrong in the equation, I shall be happy to enlighten him.

Mr. Wright says that my "formula is useless," because, "firstly, it does not apply to changes of pressure; and, secondly, it is wrong." That Mr. Wright should consider my formula for temperature to be useless because it does not apply to pressure, is an argument that would invalidate the law of Gay-Lussac on temperature. The coefficient of the expansion of gases could never have been discovered had this reason been applicable. The fact is Mr. Wright is getting deeper into the mud of confusion; but he attempts to prove my formula is wrong thus:—The reasoning from Fowne is that the rate of expansion is 460 measures at 0° C., becomes 461 at 1°, 462 at 2°, &c., whereas Mr. Niven takes "the rate of expansion at 1-492nd of the volume at any temperature whatever." Now, Gay-Lussac held that the gas increased according to temperature in a certain fixed proportion of its initial volume at 0° C., while Dalton held that the increase of volume according to temperature was by a constant fraction of its volume at that temperature. But my formula being based upon the initial rise of volume at 60° Fahr., the standard, I am between the truth of Gay-Lussac and Dalton. To use a logical phrase, there is here no excluded middle. I am, therefore, not surprised that Mr. Wright admits that, "owing to the rather hazy form of the problem," he "could not at first detect where Mr. Niven had been led into an error." Perhaps I may be excused for saying that the haziness is not in the problem but in the *ego* that viewed it. My formula for the correction of temperature, accurate to a thousandth part of unity, is the basis of a method of calculation that enables any one to solve six problems during the time in which, by the ordinary method, he could do one. Mr. Wright is in confusion between the figures, 1-460th and 1-492nd. I shall put them in a plain view. The volume of gas absolutely expands between 32° Fahr. and 212° Fahr. at the rate of 1-492nd for each degree from 32° Fahr., the formula for this being—

$$V = V^\circ\,\frac{(460 + t)}{492}$$

But when gas is reduced to the standard temperature, the factor 460, as explained in the foregoing reasoning from Fowne, is employed. Now, Mr. Wright thinks that the factor 460 is based upon absolute temperature. I reply that while 460 may be taken as implied in absolute temperature, yet even the conception of absolute temperature is based upon the law of expansion as finally fixed by Regnault; and the question arises—Can 460 be deduced from the formula that expresses the law of Regnault or Gay-Lussac? I answer—Yes. Thus, as above—

$$V = V^\circ\,\frac{(460 + t)}{492}$$

But if t increases and becomes $'t$, then the V becomes $'V$; wherefore—

$$'V = V^\circ\,\frac{(460 + {}'t)}{492}$$

But by an easy process of equation we can eliminate from these two expressions V° and 492, and then the equation becomes—

$$'V = V\,\frac{(460 + {}'t)}{460 + t}\ \ Q.\ E.\ D.$$

And thus the quotation from Fowne is merely a translation into simple language of this formula.

I now, in conclusion, repeat the celebrated argument intended to prove my ignorance: The formulæ for dry and damp gases are based upon the conception of absolute temperature; but Mr. Niven has no idea of absolute temperature, therefore he has no idea of the formulæ. Logicians would say this argument was in Camestres, and if it were not plain it could be reduced to Celarent. The form, however, is valid. Let me now say as to its matter—(1) That the major proposition is a pure assumption, and false; (2) that the minor is also false, and would be probably true were Mr. Wright's name substituted for that of Mr. Niven; and that therefore (3) the argument is invalid. For Mr. L. T. Wright to tell me that his father and Mr. Vernon Harcourt understood the subject is altogether a gratuitous statement, and I beg to inform him that he need not be displeased with me for pointing out the 480 as being now displaced by 492, for the 480 in Mr. Alexander Wright's day could only be provisionally accepted as correct. I, however, thank Mr. Wright for the occasion he has given me to explain a little more fully some facts and principles which, although cognate to the subject of my paper, yet were not necessary to my purpose in writing it.

Gas-Works, Dunoon, July 21, 1880. D. COATS NIVEN.

IF the resolutions—of which the following are three—reported to have been passed at the meeting last week of that indefinite body, the Metropolitan Municipal Association, are correctly given, a programme has been laid out that in realization will tax to the utmost, and probably overtask, the energies of so very uninfluential a set of men as those ever heard of in connection with the society. The resolutions to which we refer are:—"That it is desirable to propose such amendments in the Municipal Reform Act, 1835, as will centre in each municipality all administrative work, school board, poor law, and other results of modern legislation, and the acquisition by municipalities of all water and gas supply, so that the municipality becomes the one authority absorbing all others for purposes common to the area of municipal action." "That outside municipal areas it is desirable to confer the like authority on county boards, with full authority to deal by joint action with other county boards for control of watersheds and water and drainage administration." "That the proper solution of the London Water Question is by reporting against the agreements for purchase at present in temporary force, leaving the Metropolitan Board to deal with the question until Her Majesty's Government are prepared to take into consideration the whole question of reform of London local governments."

EXTENSIONS AT THE CHELMSFORD GAS-WORKS.—To meet the increased demand for gas all over their district, which has lately been greatly enlarged, the Chelmsford Gas Company are carrying on considerable alterations and extensions at their works at Springfield, consisting of a new gasholder-tank, gasholder and guide frame, offices, stores, and laboratory, at a total cost of about £4000. The tank and holder have been designed by the Company's Engineer, Mr. Arthur Mead, Assoc. M.I.C.E. The new offices, stores, laboratory, and other buildings will occupy a site nearer the Wharf Road than the old ones, and the latter are to be pulled down to make room for an extension of the manufacturing plant. The gasholder-tank is to be 74 feet in diameter and 24 feet deep, and is to cost £1849. It will receive a telescopic holder with an inner lift, 70 feet in diameter. The guide-frame and the holder will be so constructed that an outer lift, 72 feet in diameter, can be added when necessary at a comparatively small outlay. The capacity of the inner lift will be 85,000 cubic feet, and it can be so enlarged as to hold an additional 90,000 feet. Messrs. Samuel Cutler and Sons, of Millwall, are making the holder and guide-frame, at a cost of £2137.

NORWICH WATER-WORKS COMPANY.—The half-yearly meeting of this Company was held on Wednesday, the 28th ult.—Mr. R. N. Bacon in the chair. The Secretary (Mr. R. Cooper) read the balance-sheet, to March 25, 1880, also the report of the Directors, which stated that the revenue account showed that after payment of all working expenses, debenture interest, and dividends on preference shares, there remained a sum sufficient to pay a dividend on the ordinary shares at the rate of 6 per cent. per annum, deducting income-tax, leaving a balance of £1521 15s. 11d. to the credit of the next half year's account. The Directors had, therefore, declared a dividend at this rate. The Contractor for the new pumping-engines at Heigham was, the report stated, proceeding with their erection, and the Directors fully anticipated that the machinery would be completed and in readiness for working in the spring of next year. The existing works continued to be maintained in complete repair and efficiency. The report was unanimously adopted. Mr. T. Hawksley, the Consulting Engineer of the Company, reported that he had made his usual inspection of the works, and had found them in complete repair and performing their proper functions, and, in particular, the filter-beds afforded water of excellent quality. The new constructions had been carried out by the Manager (Mr. Ayris) in a very admirable manner, and not a fault could be found either in the brickwork, foundations, or in any other respect.

Parliamentary Intelligence.

PRIVATE BILLS RELATING TO GAS, WATER, Etc.

SESSION 1880.

PROGRESS MADE TO SATURDAY, JULY 31.

Title of Bill.		Petition for Bill Presented.	Bill Read the First Time.	Bill Read a Second Time.	Bill Reported.	Bill Read the Third Time.	Bill Received Royal Assent.
Ackworth, Featherstone, Purston, and Sharlston Gas Bill	Lords	Comns. Bill	June 25	July 5	July 15	July 20	..
" " "	Commons	Feb. 9	Feb. 10	March 8	June 15	June 24	..
Birkenhead Borough Bill	Lords	Bill with-	drawn.				
" "	Commons						
British Gaslight Company, Limited (Staffordshire Potteries), Bill	Lords	Feb. 10	Feb. 10	Feb. 23	June 17	June 22	..
	Commons	Lords Bill.	June 24	July 5	July 20	July 28	..
Burton-upon-Trent Corporation Bill	Lords	Comns. Bill	May 27	June 4	July 23	July 27	..
" "	Commons	Feb. 9	Feb. 10	Feb. 16	March 11	May 25	..
Cardiff Water Bill	Lords	Feb. 10	Feb. 10	Feb. 20	March 8	March 11	..
" "	Commons	Lords Bill.	March 11	May 31	June 11	June 15	June 29
Chester Gas Bill	Lords	Comns. Bill	March 12	March 19	June 4	June 8	..
" "	Commons	Feb. 9	Feb. 10	Feb. 24	March 2	March 11	June 29
Cork Gas Bill	Lords	Bill with-	drawn.				
" "	Commons	Feb. 9	Feb. 10	March 1	June 18		
Cork Improvement Bill	Lords	Comns. Bill	June 25	July 5	July 15	July 19	..
" "	Commons	Feb. 9	Feb. 10	Feb. 16	June 15	June 24	..
Dagenham and District Farmers (Optional) Sewage Utilization Bill	Lords	Comns. Bill	July 9	July 16	July 23	July 29	..
	Commons	Feb. 9	Feb. 10	Feb. 17	June 15	July 8	..
Dartford Gas Bill	Lords	Comns. Bill	July 15	July 23	July 27	July 30	..
" "	Commons	Feb. 9	Feb. 10	March 15	July 6	July 15	..
Dearne Valley Water Bill	Lords	Feb. 10	Feb. 10	Feb. 16	March 16	May 25	..
" "	Commons	Lords Bill.	May 28	June 15	June 22	July 5	..
Denton and Haughton Gas Bill	Lords	Comns. Bill	June 1	June 10	June 18	June 22	June 29
" "	Commons	Feb. 9	Feb. 10	Feb. 16	March 17	May 31	..
Doncaster Corporation Water Bill	Lords	Feb. 10	Feb. 10	Feb. 16	March 16	May 25	June 29
" "	Commons	Lords Bill.	May 28	June 8	June 22	June 25	..
Eastbourne Gas Bill	Lords	Comns. Bill	May 27	June 8	June 24	June 28	July 9
" "	Commons	Feb. 9	Feb. 10	Feb. 25	March 12	May 25	..
Edinburgh and District Water Bill	Lords	Feb. 10	Feb. 10	Feb. 16	Feb. 26	March 2	..
" " "	Commons	Lords Bill.	March 5	March 15	June 1	June 10	June 14
Exmouth and District Water Bill	Lords	Comns. Bill	June 25	July 5	July 8	July 12	..
" " "	Commons	Feb. 9	Feb. 10	Feb. 23	June 11	June 24	July 19
Gaslight and Coke, Commercial Gas, and South Metropolitan Gaslight and Coke Companies Bill	Lords	Comns. Bill	July 19	July 27	..	..	..
	Commons	Feb. 9	Feb. 10	Feb. 17	July 9	July 19	..
Great Yarmouth Water Bill	Lords	Comns. Bill	July 6	July 15	July 19	July 22	..
" "	Commons	Feb. 9	Feb. 10	March 1	June 25	July 5	..
Hinckley Local Board Gas Bill	Lords	Comns. Bill	July 8	July 19	July 29	..	..
" "	Commons	Feb. 9	Feb. 10	March 8	June 29	July 8	..
Huddersfield Tramways and Improvement Bill	Lords	Comns. Bill	June 25	July 5	July 8	July 12	..
" "	Commons	Feb. 9	Feb. 10	Feb. 16	June 14	June 24	..
Hull Lighting Bill	Lords	Comns. Bill	June 29	July 9	July 19	July 23	..
" "	Commons	Feb. 9	Feb. 10	Feb. 16	June 11	June 28	..
Hyde Gas Bill	Lords						
" "	Commons	Feb. 9	Feb. 10	Feb. 23	June 14	Preamble	not proved.
King's Lynn Corporation Bill	Lords	Comns. Bill	July 6	July 15	July 22	July 26	..
" "	Commons	Feb. 9	Feb. 10	Feb. 16	June 9	July 5	..
Lancashire County Justices (Water, &c.) Bill	Lords	Feb. 10	Feb. 10	Feb. 16	March 11	March 13	..
" "	Commons	Lords Bill.	March 16	June 7	June 15	June 24	June 29
Lancaster Corporation Bill	Lords	Comns. Bill	June 18	June 28	July 6	July 9	..
" "	Commons	Feb. 9	Feb. 10	Feb. 16	March 12	June 18	July 19
Lincoln Gas Bill	Lords	Comns. Bill	June 22	July 6	July 13	July 16	..
" "	Commons	Feb. 9	Feb. 10	March 12	June 8	June 21	July 19
Liverpool Corporation Water Bill	Lords	Comns. Bill	July 8	July 19	July 22	July 26	..
" "	Commons	Feb. 9	Feb. 10	Feb. 24	July 1	July 8	..
Liverpool United Gas Bill	Lords	Comns. Bill	May 28	June 7	July 19	July 26	..
" "	Commons	Feb. 9	Feb. 10	Feb. 24	March 12	May 27	..
London Gaslight Company Bill	Lords	Comns. Bill	June 29	July 8	July 15	July 19	..
" "	Commons	Feb. 9	Feb. 10	March 1	June 17	June 28	..
Maidstone Gas Bill	Lords	Comns. Bill	July 2	July 12	July 15	July 19	..
" "	Commons	Feb. 9	Feb. 10	Feb. 23	June 22	July 1	..
Malton Gas Bill	Lords	Comns. Bill	June 25	July 5	July 8	July 12	July 19
" "	Commons	Feb. 9	Feb. 10	March 8	June 11	June 24	..
Oldham Improvement Bill	Lords	Comns. Bill	July 6	July 15	July 22	July 27	..
" "	Commons	Feb. 9	Feb. 10	Feb. 16	June 17	July 5	..
Phœnix Gaslight and Coke Company Bill	Lords	Bill with-	drawn.				
" "	Commons						
Portmadoc Water Bill	Lords	Feb. 10	Feb. 10	Feb. 16	May 31	June 3	..
" "	Commons	Lords Bill.	June 4	June 14	July 16	July 20	..
Prescot Gas Bill	Lords	Comns. Bill	May 28	June 7	June 14	June 17	June 29
" "	Commons	Feb. 9	Feb. 10	Feb. 23	March 12	May 27	..
Preston Improvement Bill	Lords	Comns. Bill	June 25	July 5	July 16	July 20	..
" "	Commons	Feb. 9	Feb. 10	Feb. 16	June 15	June 25	..
Rathmines and Rathgar Township (Vartry Water Supply) Bill	Lords	Feb. 16	Feb. 16	March 11	June 7	Preamble	not proved.
	Commons						
Rathmines and Rathgar Township Water Bill	Lords	Feb. 10	Feb. 10	Feb. 16	June 7	June 14	..
Reading Gas Bill	Lords	Lords Bill.	June 18	June 29	July 20	July 30	..
" "	Commons	Comns. Bill	June 29	July 8	July 15	July 19	..
Rochester Corporation Bill	Lords	Feb. 9	Feb. 10	March 1	June 17	June 28	..
" "	Commons	Comns. Bill	July 9	July 23	July 26	July 29	..
Sea Water Supply to London Bill	Lords	Feb. 9	Feb. 10	Feb. 16	July 2	July 9	..
" "	Commons	Feb. 10	Feb. 10	Feb. 16	March 2.	Preamble	not proved.
Sligo Borough Water Bill	Lords	Feb. 10	Feb. 10	Feb. 16	June 11	June 15	..
" "	Commons	Lords Bill.	June 17	June 28	July 20	July 23	..
South Metropolitan Gas Company Bill	Lords	Bill with-	drawn.				
" "	Commons	Feb. 9	Feb. 10				
Southwark and Vauxhall Water Bill	Lords	Bill with-	drawn.				
" "	Commons	Feb. 9	Feb. 10	Feb. 23			
Stafford Borough Bill	Lords	Comns. Bill	June 3	July 1	July 5	July 9	July 19
" "	Commons	Feb. 9	Feb. 10	Feb. 23	March 17	June 1	..
Wakefield Corporation Water Bill	Lords	Feb. 10	Feb. 10	Feb. 16	March 11	March 16	July 9
" "	Commons	Lords Bill.	March 18	June 7	June 25	July 7	..
Wandsworth and Putney Gas Bill	Lords	Comns. Bill	June 25	July 5	July 6	July 9	July 19
" "	Commons	Feb. 9	Feb. 10	March 2	June 8	June 24	..
Wigan Improvement Bill	Lords	Comns. Bill	June 25	July 5	July 19	July 23	..
" "	Commons	Feb. 9	Feb. 10	Feb. 17	June 11	June 24	..
Wrexham Water Bill	Lords	Comns. Bill	June 22	July 1	July 2	July 6	July 19
" "	Commons	Feb. 9	Feb. 10	March 4	June 11	June 21	..
Yeadon and Guiseley Gas Bill	Lords	Comns. Bill	June 25	July 5	July 12	July 15	..
" "	Commons	Feb. 9	Feb. 10	March 10	June 11	June 22	..

HOUSE OF LORDS.

MONDAY, JULY 26.

A petition was presented against The Gaslight and Coke, Commercial Gas, and South Metropolitan Gaslight and Coke Companies Bill, from The Gaslight and Coke Company.

THURSDAY, JULY 29.

The Gaslight and Coke, Commercial Gas, and South Metropolitan Gaslight and Coke Companies Bill was referred to a Select Committee, consisting of Lord Wolverton (Chairman), the Marquis of Exeter, Lord Boyle, Lord Somerton, and Lord Brabourne; to meet on Monday Aug. 2.

MONDAY, AUG 2.

The Chairman of Committees informed the House that the opposition to The Gaslight and Coke, Commercial Gas, and South Metropolitan Gaslight and Coke Companies Bill had been withdrawn.

HOUSE OF COMMONS.

TUESDAY, JULY 27.

RATHMINES AND RATHGAR TOWNSHIP WATER BILL.

On the motion for the consideration of this Bill,

Mr. MAURICE BROOKS said he wished to propose the insertion of a new clause, which was of so reasonable a character that the House could hardly decline to accept it. When the measure was before the House for second reading, he opposed it; but it was suggested by the Chairman of Committees that the Bill should be submitted to a Select Committee, because an investigation could be better made there than in the House, and the opponents as well as the promoters of the Bill would there have full opportunity of making their case known. The measure was therefore referred to a Select Committee, but it was afterwards found that the ratepayers of Dublin had no *locus standi* to oppose the Bill on its merits. There was no doubt the Corporation of Dublin, in the Bill promoted by them some years ago, contracted themselves out of any power or authority to oppose any water scheme promoted by any body residing in the neighbourhood of Dublin. The present Bill was passed by the Committee, and he appealed to the House to suspend its operation for a short time, in order that some evidence might be produced which was not adducible before the Committee. The township of Rathmines and Rathgar (the Commissioners of which were promoting the present Bill) and the city of Dublin were divided by a canal and connected by various bridges, and only an imaginary boundary line separated them. A Commission, appointed by the Viceroy and the Privy Council, had been sitting in Ireland for some months, in order to consider the feasibility and the propriety of uniting the city of Dublin with the township of Rathmines and Rathgar. The report of that Commission was expected every day, and it was fully believed it would recommend the annexation of the township to the city. If this should be so, the £150,000 which it was intended to expend on the construction of the works proposed in the Bill would be utterly lost to the ratepayers, without any corresponding advantage to a single soul living. The water supply belonging to the city of Dublin was superabundant. Every day a larger quantity ran to waste than would provide for the township of Rathmines and Rathgar three times over. There was enough in the whole supply to give 40 gallons of water daily to every inhabitant of the city and township together. The Corporation of Dublin having this supply literally at the door of the township, said to the Commissioners, "We are willing to give you any quantity of water that may be necessary, under arrangements, subject to the arbitration of any tribunal which the House of Commons may appoint." It might be asked, "Why, then, do the Rathmines and Rathgar Township Commissioners object to take the Vartry water, and why do they ask for a distinct scheme of water supply?" It was hardly necessary to remind the House of the jealousy that existed between neighbouring authorities. The Commissioners of Rathmines and Rathgar, who for a long time had managed the township and local affairs with great skill and success, were unwilling to be absorbed by the Corporation of Dublin. They were anxious to maintain their position of isolation. The Commission to which he had referred inquired into the question of the boundary between the city of Dublin and the township of Rathmines and Rathgar, and the Rathmines Commissioners, knowing that the report would recommend the annexation of their township to Dublin, had promoted the Bill. He therefore proposed the insertion of a clause suspending the operation of the Bill for twelve months, and submitted that his proposal was a very reasonable and moderate one. If the Commission recommended the annexation of Rathmines to the city of Dublin, then the £150,000 proposed to be expended under the powers of the Bill would be thrown away, but if they did not so recommend, then all that would be lost would be twelve months.

Colonel TAYLOR said the opposition that was now offered to the Bill was entirely unusual and he might say unfair. The Bill had gone through all stages in the House of Lords, and had since passed under the review of a Committee presided over by Sir Wilfrid Lawson. There was nothing to warrant the pressure placed upon them by the member for the city of Dublin, other than that they wished to force upon an unwilling township the water which they considered to be the best. The honourable member had talked about the annexation which would probably be reported by the Commission as being so desirable. No report had yet been made, and he had yet to learn that it would be. Rathmines was perfectly well able to take care of itself, and was very averse indeed to annexation.

Mr. MELDON said the question raised by the honourable member for the city of Dublin was a very simple one. In Dublin they had the best water supply in the United Kingdom. It was ample enough to supply the whole of the Rathmines district, and the Dublin Corporation were quite willing, even at the present time, that Rathmines should have that supply. A Commission had been sitting to inquire into the question of the extension of the city boundaries into the neighbouring township, and it was possible that in a few months a report to this effect would be presented. If the boundaries were extended, nothing could be more prejudicial to the ratepayers of Rathmines than the carrying out of the proposed scheme. But supposing the extension were not carried out, then the Commissioners would have obtained their Bill, and would be able to get their own water supply. All that the member for Dublin wanted was that they should know whether the city boundaries were to be extended or not, because if they were he did not think the House would for one moment assent to the third reading of the Bill.

Mr. SYNAN considered that the proposed postponement would be no injury whatever to the township of Rathmines, for if the Commission did not report in favour of the extension, then the works could be proceeded with.

Mr. MITCHELL HENRY thought the motion was a just and right one. It was not a motion to defeat the Bill, but merely to postpone its action for twelve months. The Corporation had not been allowed, by the technical rules of the House, to appear before the Select Committee, and under the circumstances only desired, in the interests of the city, that the action of the Bill should be postponed until it was decided whether Rathmines was to be united with Dublin.

Mr. RODWELL opposed the motion. It was important, he said, to bear in mind that the township of Rathmines had been very ungenerously treated by the Corporation of Dublin, for in 1874 the Corporation actually excluded Rathmines from the operation of their Bill, and would not bind themselves to supply the township with water if it were insisted upon. Therefore Rathmines in that year was left helpless. But what more did the Corporation do? They bound themselves not to oppose any person or corporate body who should seek parliamentary powers for any portion of the district excluded by their Bill. One of the portions excluded was Rathmines, and yet the Corporation of Dublin had opposed the Rathmines Bill on its second reading, and now they were opposing it again on its third reading. He trusted that the House would not give effect to the motion, which was of a very insidious character, and which, to say the least of it, was intended to defeat the Bill, and to place Rathmines at the mercy of the Dublin Corporation.

Dr. LYON PLAYFAIR said he could confirm the statement of the honourable and learned member who had just spoken. The object of the clause, unfortunately, was a large one. It was ostensibly to postpone the action of the Bill for a year, but for how much more than a year he did not know. Ever since 1863, the township of Rathmines had had the right to receive water from Dublin, but it was not so supplied, though Dublin had a large and admirable supply of water. The canal from which Rathmines was supplied having become impure, the township was now badly supplied, and there was therefore urgent need for a fresh supply. He pointed out that not only had the Bill now before the House been examined, but also a competing Bill, which had been thrown out in the House of Lords. What would be the effect of the postponement? The effect would be that next year the other Bill, which was rejected as not being a proper competing Bill, would again be put into competition with the Bill which had received the sanction of the Select Committee, and the township of Rathmines would be subjected to the expense of again opposing the competing Bill. It was true that there might be an extension of the city boundaries, and that Rathmines might become a portion of Dublin; but in order to effect this an Act of Parliament would be necessary, and then Rathmines would have *locus standi*, whether it had a Water Bill or not. Rathmines at present preferred its own water system, which had received the sanction of the other House, and it would be very hard indeed if the House of Commons were now to refuse its assent to it.

Mr. A. M. SULLIVAN said the speech of the right honourable gentleman who had just spoken would lead the House to believe that the city of Dublin had been appealed to by the township of Rathmines to supply it with water, and had been refused. The exact contrary was the case. Rathmines had been refusing to take water from Dublin, while Dublin had been willing to supply it.

The Hon. D. PLUNKET thought that there had seldom been a more unprecedented or a more unusual course taken than that which had been adopted in the present instance. When the Bill was first brought forward it was opposed in both Houses of Parliament, although it was found that only 6 ratepayers, out of the 3000 which constituted Rathmines, dissented from the proposals made in the Bill. This opposition having been disposed of, the opponents of the measure adopted unprecedented means of trying to get it postponed for a year and a half on the chance of the Corporation of Dublin being in a position to dictate to them at that time. He, however, trusted the House would not, under these circumstances, allow such a course to be pursued with success.

Dr. LYONS said it did seem a somewhat invidious thing to oppose the Bill at almost its last stage, but it must be borne in mind that this was but the cropping up again of an old and well-known struggle. If the House sanctioned the principle of the Bill, it would be sanctioning the very condition of things to obviate which a Commission was now sitting; while in the district, ready provided, there was a most abundant water supply. None knew better than those connected with the Rathmines district that this was a local war which had been long going on, and he contended that it was contrary to public policy that it should be allowed to go on any longer.

Sir P. O'BRIEN thought it would not be to the advantage of Private Bill Legislation if the decisions of two Parliamentary Committees were to be set aside in the last stages of a Bill.

Mr. FINDLATER submitted that the present action was a very unfair attempt to repeat the opposition which was made by the Corporation of Dublin on the second reading of the Bill; for it must be evident to every one that the Corporation were the real opponents of the measure.

Mr. DODDS reminded the House that in 1861 the Corporation of Dublin obtained power to supply Rathmines with water, but their Act of 1874 set forth the necessity of limiting the district to be supplied, and Rathmines was expressly excluded, the Act saying "provided that the Corporation shall not hereafter have power to oppose any persons seeking to supply that district with water." The Bill had been before a Select Committee, and if it were now to be rejected the House might as well not have Committees at all. He hoped the House would not listen to the appeal which had been made, the effect of which would be the rejection of the Bill, and the practical revoking of what they did when they sent the Bill to a Select Committee.

Mr. CALLAN said the real question at issue in the present case was as to the price of water. It only remained to fix the price, and Rathmines would have the best water supply in Great Britain. Why not, he asked, appoint a Commission to fix the price at which the Corporation of Dublin should supply Rathmines with water? This would save all the bickering and the squandering of close upon £100,000, and would secure for the inhabitants of Rathmines a good water supply. He moved the adjournment of the debate, in order that this matter might be considered.

Mr. FOLEY seconded the motion for adjournment. The object of the township of Rathmines was, he said, to procure water on fair terms, and finding that they could not get it on fair terms from the Corporation of Dublin, they were endeavouring to obtain it on their own account. As this was purely a question of money, and as the Bill was brought forward for the purpose of preventing the Corporation of Dublin from exercising coercion on the inhabitants of Rathmines, and compelling them to take water at an unreasonable rate, he thought it would be better for the debate to be adjourned, so that an agreement might, if possible, be arrived at.

Mr. O'CONNOR POWER appealed to the honourable member for Dublin to assent to the motion for adjournment. From all he (Mr. Power) had heard on the subject, it seemed to him that Rathmines proposed to construct water-works at a cost equal to the expenditure that would be incurred if an arrangement were made with the Dublin Corporation. If this were so, nothing was required to settle the difficulty but a little time and patience; and if the parties met together they might come to some harmonious conclusion among themselves.

Mr. P. MARTIN did not know any case in which the opponents of a private Bill had less right to raise a discussion than the present. The question of how far the Dublin Corporation were competent to supply Rathmines with water had already been considered for at least six days before a Committee of the House of Lords. There was before them a competing scheme, and the whole question was discussed at length and decided. Besides, in 1874 the Dublin Corporation deliberately struck the

township of Rathmines out of the benefit of the Vartry water supply scheme. Under these circumstances, he trusted the House would not sanction the principle that after a Bill had gone through its course in Committee a debate should be raised in the House, and adjourned. The effect of an adjournment would be what the honourable member for Dublin seemed to wish—namely, to postpone the Bill *sine die*.

Sir W. Lawson said Mr. Granville Somerset told the Committee, when the Bill was before them, that, appearing for the Corporation of Dublin, he did not practically oppose the preamble, but only the clauses.

After some further discussion,

The motion to adjourn the debate was withdrawn, and on the question "That the proposed clause be read a second time" being put, the House divide, and the numbers were—

For the clause	51
Against	251
Majority against	200

The clause was therefore rejected, and the Bill ordered to be read the third time.

Wednesday, July 28.

BRITISH GASLIGHT COMPANY, LIMITED (STAFFORDSHIRE POTTERIES), BILL.

On the order for the third reading of this Bill,

Mr. Woodall said: I rise to move, in accordance with the notice I have given, the rejection of this Bill; and I hope to satisfy the House, in the few words I shall speak, that, in asking them to take this exceptional course, I am asking them to take a course which is but reasonable. The promoters of the Bill are known as the British Gaslight Company, Limited. They supply, in addition to two towns of the six which I have the honour to represent, the city of Norwich, and a portion of the town of Hull, and these separate places they supply under separate Acts of Parliament, and in addition they supply several other towns, for which they have no statutory powers, and until this year there has not been any parliamentary restriction upon them in respect to those towns. I may state also that they supply some other districts under certain arrangements; but while they have these numerous districts all over the country, the whole management is in a London Board, with their offices in the City. Now, the Bill before the House was introduced into the other House, and was opposed before a Committee of that House by the Corporation of the borough of Hanley and the Tunstall Local Board, in which two places there is a strong and unanimous feeling against the Company, and the greatest dissatisfaction with the way in which its business is transacted. The Committee of the House of Lords passed the preamble of the Bill, and suggested certain modifications in the clauses; but the petitioners, desiring to reserve their case, refrained from discussing the clauses in the other House. Honourable members may imagine the mortification of my constituents on finding that, on a technical construction of the rules of this House, the petitioners had no *locus standi* before the Committee appointed to consider the measure, inasmuch as the promoters of it merely asked for powers to employ a further amount of capital. I do not for a moment call in question the decision of the Court of Referees. I am sure that in coming to it they did so upon what they deemed to be a correct interpretation of the precedents that had been established; but I think that it is a case of extreme hardship, injuriously affecting the interests of the population of the district, which probably for the next 20 or 30 years will be handed over, as to what may be regarded as a necessary of life, to the tender mercies of the Company who have the supply of gas in their own hands. I will not go into the details of the case; but I may observe that of late it has been the practice, when a company has come to Parliament to raise further capital, to impose restrictions on the company, compelling them to sell their new capital by public auction or tender; but it is pleaded that, in consequence of the peculiar position of this Company, they are unable to adopt the auction clauses. They have, however, accepted a restriction of 5 per cent., which is to be the maximum dividend to be paid on the new capital. Now I do not conceal for a single moment that this is an important protection to the public interest, but from the fact that the Company have separate Acts of Parliament for their different districts, and have a central management, they practically, by an ingenious process, defeat the provisions of the general Act of Parliament. For instance, under their Act for the Staffordshire Potteries they were forbidden to pay more than a maximum dividend of 10 per cent. on the original shares, and they were limited to 7½ per cent. on the additional share capital raised; but it will hardly be believed by the House that as a matter of fact the Company have paid an uniform 10 per cent. on all the capital employed in their undertaking, and at this moment I hold in my hand a circular sent out by the Company, in which they propose to issue new £20 shares to meet this further outlay, the interest on which is restricted to 5 per cent., and yet they offer to issue these £20 shares at £34 each. Nothing could be more clear than the fact that, by some clever manipulation, they in some way or other contrive to pay the whole of their Shareholders a dividend in excess of that sanctioned by Parliament. They plead that in the Staffordshire district they have not been able to earn even the maximum dividend already allowed by law. I think we should be able to show, if we were permitted to go before a Select Committee, that this is largely to be attributed to the manipulation I have spoken of, or, as the inhabitants complain, of gross mismanagement of the Company's business. In proof of this, I may state that within the borough I have the honour to represent, three municipal boroughs—Burslem, Stoke, and Longton—have purchased the gas-works of those towns. They bought them at a large premium on the original shares, but they have been able not only to pay the interest on the large capital necessary to be raised, but they have also been able to write off annually a certain portion of the capital itself, to set aside a sum for contingencies, and out of the surplus profits they have appropriated an ample sum, and have saved the public an amount equivalent to a reduction of 7d. per 1000 feet in the price of gas. This is a case of peculiar hardship on the opponents of the Bill under discussion. There is nothing in common between the proprietors of these gas-works and the gas consumers of the district, and the inhabitants of Hanley and Tunstall naturally desire to be placed in as good a position as their neighbours. They are willing to pay—they have offered to guarantee the British Company their maximum dividend; they have offered 20 years purchase; and they have proposed to buy on the terms which an arbitrator might name. My constituents having had no opportunity of submitting these details to the consideration of a Select Committee, I hope the House will refrain from passing the Bill, which would make my constituents helpless in this matter for a long term of years. Their only opportunity of bringing their grievance before Parliament is when, as on this occasion, the Company come to Parliament for power to expend further capital. I am authorized to state that neither the public interest nor the interest of the Company will suffer by the Bill being delayed for another year. The evidence goes to show that there has been no great increase of business within the last few years, and therefore I move—"That the Bill be read the third time upon this day three months." I thank the House for their indulgence, and for thus enabling me, in the interest of my constituents and of a large population, to state the reasons why they should not confirm what would undoubtedly be a gross wrong.

Mr. Pemberton: I was a member of the Court of Referees to which the honourable member has referred in this case, and on that occasion had the honour of acting as Chairman. I beg, therefore, to acknowledge the courtesy of the honourable gentleman in giving me notice of his intention to move the rejection of the Bill—not that I understand that he in any way impeaches the decision of the Court, but that he simply wishes to call the attention of the House to the way in which that decision operated unfavourably to the population of the district to which the Bill refers. The House is aware of the constitution of the Court of Referees. It is composed partly of members of the House and partly of the Official Referees. The Court does not go at all into the merits of the Bill before them. They simply decide, when a petition is presented against a Private Bill, whether, according to the practice of the Court, the petitioners have a right to be heard, and to go before the Committee which has to decide on the merits. In coming to this decision, they invariably go on the practice of the Court—the practice laid down partly by Standing Orders, and partly by previous decisions, which are carefully reported and published by barristers practising at the parliamentary bar; and though the Court has never conceived itself bound to invariably follow these decisions if they have been arrived at by some mistake or some peculiarity in a particular case, I think it will not be found that on this occasion there has been any hardship whatever, and that the rule laid down by the Court is founded on justice. Where a water company or a gas company simply come forward with a Bill to improve their existing works without raising additional capital, without increasing the rates charged to the consumers, without decreasing the quantity or deteriorating the quality of the article—where, in fact, they do nothing but improve the existing supply and their works, under powers which they already possess—in that case we consider the consumers have no right at all to resist the progress of the Bill, the Bill being simply for their advantage, and for the improvement of the supply. This was the case on the present occasion, and, so far as I understand the argument of the honourable gentleman, there is nothing at all unusual in this instance. There is no proposed increase of the rates; there is no deterioration in the quality or decrease in the supply, and the Bill has for its object solely the improvement of the works of the Company under powers which they already possess. The merits of the Bill were not gone into by the Referees. The House will remember that the Bill has already been approved of by a Committee of this House, as well as by a Committee of the other House, and that it has received the careful consideration which all Bills receive at the hands of the right honourable gentleman the Chairman of Ways and Means. So much, then, as relates to the practice of the House and the reasons why the petitioners are not to be allowed to be heard. If I may return for a moment to the merits of the case, which I have heard now for the first time from the honourable member who moved the rejection of the Bill, I think the House will arrive at the conclusion that the objections apply solely and purely to past legislation. Whatsoever may have been the origin of the Company, whatsoever may have been their past faults, these, of course, would have nothing whatever to do with the present proceedings; and with them the Committee had nothing to do. The honourable member told us that the Company is managed by gentlemen in London, who have no connection with the locality, and do not understand its requirements. If this is so, it is a complaint against the Act under which the Company was constituted, and can in no way be applied to the present scheme, which simply authorizes the application of capital, which already exists, to the improvement of the works at Hanley. The same observation may be made with regard to the other objection against the Bill. I dare say the Company is authoritatively constituted, and that there is no power of checking their accounts, and it may be that all the objections the honourable gentleman has urged against the Company exist. But these are objections to past legislation, and they cannot in any way be remedied or made worse by the present scheme. I do not know whether it is a fact, but it is stated that the promoters of the opposition wish to purchase the Company's undertakings, and that they at present have no power to do so. If they wish to purchase, the proper course is for them to bring in a Bill for the compulsory acquisition of the works. The Bill of the Company now before the House simply proposes the improvement of their works, and contains no clause compelling them to sell the undertaking which the promoters of the opposition wish to purchase, and with which the present Company have not the slightest wish to part. The action I have taken is simply with reference to the refusal of *locus standi* to the petitioners, and I hope I have convinced the House that, according to the practice of the Court of Referees, the petitioners had no right to be heard, and that the honourable gentleman has not made out any case of hardship, or any grievance which would justify the House in departing from the usual practice.

Dr. Lyon Playfair (Chairman of the Committee of Ways and Means) said: I would ask the House to consider what happened yesterday [when there was a long discussion on a Railway Bill, which was thrown out on the third reading, and upon the Rathmines and Rathgar Township Water Bill, given above] and what is happening to-day, because I think the course we are pursuing in discussing Private Bills at late stages of the session, and at great length, in this House, tends to stop the ordinary course of business. Yesterday a Bill, which until then was unopposed, occupied several hours of the time of the House. To-day a Bill unopposed hitherto, as far as the House of Commons is concerned, is now opposed on the third reading. It requires very exceptional reasons indeed to justify the House in throwing out a Bill in its last stages. There is certainly something exceptional which would justify Hanley in being a little jealous as to the increase of capital of this Company, and if Parliament were now asked for the first time to constituto a company not belonging to the locality, and to give them power to govern the whole district, I do not think it likely that Parliament would give such a company that power. But it must be remembered that this is a Company which was established 30 years ago, when the manufacture of gas was not so profitable as it is now. The Company was invited, many years ago, by the people of the Staffordshire Potteries, to go to Hanley and assist them in making gas and providing light for the locality, and two Acts of Parliament, I think in 1855 and 1856, gave them the powers by which they are regulated. The conditions are not very onerous. The Staffordshire Potteries must be supplied with gas at 3s. 6d. per 1000 feet. The Local Government Board, in some other cases, have sanctioned 6s., and even 7s. per 1000 feet as a maximum; but I have remonstrated, as Chairman of the Committee of Ways and Means, and have reduced the maximum to 4s. 6d. per 1000 feet. Here they are to be supplied with gas at a maximum of 3s. 6d. per 1000, which cannot be considered a high price. The Company have established themselves in the Staffordshire Potteries, and, no doubt, they carry on a fairly remunerative trade. On £40,000 of their capital they have 10 per cent. dividend, on £30,000 they have 7½ per cent., and they now ask to raise £50,000 on which they are limited to 5 per cent. These conditions are not onerous, and the whole question comes to this: Hanley, seeing that it is a remunerative undertaking, now wishes to carry

on its own gas-making, and wishes to purchase the Company's works; but the Company, having at last made the works remunerative, do not wish to sell; and Parliament has never yet given compulsory powers to a Corporation to buy an undertaking against the wish of the proprietors of that undertaking. Therefore, though Hanley has a perfect right to come forward and promote a Bill and see whether Parliament will give to it compulsory powers, it is at the same time quite natural that the Company should seek to defend their rights. Consequently I do not think the House should throw out the Bill on the third reading.

Colonel MAKINS: I am not going to take up the time of the House to repeat what was said yesterday, because I do not think the House will adopt the amendment proposed by the honourable member. The fact is, the honourable member has played the part of Ahab. He wants to have this vineyard, or gas-works, and he wants the House to act the part of Jezebel. (Laughter.) I hope the House will do nothing of the kind. The Gas Company has carried on its business under an Act of Parliament, and if there is any pretence of complaint on the part of the inhabitants, why do they not proceed against the Company, as the Act provides, for the recovery of penalties? The fact is the Bill has gone through every stage of inquiry through the House of Lords and through the House of Commons, and now meets with unlooked-for opposition in this House at the last stage. I am quite sure that anything in the nature of a motion like this has never before been presented to the House, and that there is absolutely no precedent for the House of Commons throwing out a Bill of this kind, under such circumstances, on the third reading.

The House then divided on the question, when there appeared—

For the third reading	70
Against it	29
Majority	41

The Bill was accordingly read the third time, and passed.

HOUSE OF COMMONS COMMITTEE.

WEDNESDAY, JUNE 9.

(*Before Mr.* ABEL SMITH, *Chairman; Mr.* H. B. SAMUELSON, *Lord* MORETON, *and Baron* HENRY DE WORMS; *Mr.* BONHAM-CARTER, *Referee.*)

CORK GAS BILL.

Mr. RICHARDS, Q.C., and Mr. MICHAEL, Q.C., appeared for the promoters: Mr. GRANVILLE SOMERSET, Q.C., Mr. F. CLIFFORD, and Mr. PEMBROKE STEPHENS for the Corporation of Cork; and Mr. YOUNG for consumers of gas in Cork and its vicinity, petitioners against the Bill.

Mr. RICHARDS, in opening the case for the promoters, described the Bill as one for granting further powers to the Cork Gas Consumers Company—viz., to alter the price charged for gas, and also the dividends the Company were authorized to pay under their former Act. The Company were originally registered under the Joint-Stock Companies Act; and in 1857 entered into possession of their present works and plant, and in 1858 they contracted for the lighting of the public lamps, and also for the supply of private consumers. At that time another Company was in existence in Cork, known as the United General Gas Consumers Company, and a competition of a ruinous description was carried on, until, in April, 1859, the latter Company were obliged to retire, having sold their plant to the promoters of the present Bill. In 1868 the Corporation of Cork introduced a Bill in Parliament, in which, amongst other things, they sought power to make and supply gas to the city of Cork, at a cost of 5s. per 1000 feet within the borough and 6s. per 1000 feet without, and at the same time the Gas Consumers Company promoted a rival scheme, in which they offered to supply the gas at 4s. 9d. and 5s. 6d. respectively. Some negotiations took place, and, in the end, the Corporation withdrew the gas clauses of their Bill, and the Company's measure was passed unopposed. By that Act the Company were enabled to raise £150,000 in shares, with a dividend limited to 8 per cent., and to borrow £37,500 on debenture stock. The illuminating power of the gas was to be 14 candles, and the price 4s. 9d. per 1000 feet within the borough and 5s. 3d. without. The Company continued to pay 8 per cent. until 1873, when, in addition, they put by a small sum as a reserve-fund, which they were perfectly entitled to do under their Act. In that year the coal famine occurred, when prices rose to an unprecedented height, whereby several gas companies were absolutely threatened with ruin. To meet this emergency, an Act was passed by Parliament, known as the Gas and Water Works Facilities Act, 1873, under which power was given of applying to the Board of Trade for permission to charge an increased price for gas for a limited time, to meet the extra cost of production. The Cork Gas Company applied to the Board of Trade with this object, and an inquiry was held at which the Company were opposed by the Corporation, who had engaged Mr. G. W. Stevenson to support their case; and this gentleman stated that the whole management of the Company was extremely reprehensible, especially in the matter of unaccounted-for gas. The leakage at that time amounted to 20 per cent., whilst Mr. Stevenson stated that 10 per cent. was an ample allowance. Mr. Vernon Harcourt, however, who conducted the inquiry for the Board of Trade, decided that 15 per cent. would be a reasonable amount to allow for unaccounted-for gas, and he ultimately granted the Company permission to increase their charge 6d. per 1000 cubic feet for a period of two years. In 1879 the contract with the Corporation for public lighting expired, and the Company offered to renew it at the reduced rate of 4s. 3d. per 1000 feet, but at the same time refused to be content with a sum of 3d. per 1000 feet for repairs to plant, &c., which they were allowed in the former contract, the Company having found that this amount had by no means covered the outlay incurred; but the Corporation would not consent to any increase, and some bad feeling arose, which had culminated in the present opposition. The additional capital asked for in the Bill was £25,000, with borrowing powers to the extent of £6250; and by the fifth clause the dividend on the new capital was limited to 5 per cent., and on the old to 7 per cent. The promoters had also incorporated the auction clauses, according to the Standing Orders of the House. The learned Counsel then proceeded to deal with the petitions against the Bill, which, he said, were signed by people who had no interest in any way in the Company, and several of whom were neither ratepayers nor gas consumers.

The following evidence was called:—

Mr. *Denny Lane*, examined by Mr. RICHARDS.

I have been Secretary to the Cork Gas Consumers Company since its formation, in 1856, under the Joint-Stock Companies Act. By the powers of a local Act then existing, we had authority to open the streets so long as we were contractors for the Corporation, who were allowed to contract for a period not exceeding three years. At the time of the formation of the Company the city of Cork was supplied by the United General Gas Company, as were likewise a large portion of Dublin and also the city of Limerick. This Company was bought out in 1859, and we then became the sole suppliers of gas in Cork. In 1868 we obtained the Act of Parliament under which we are now working. Under this Act our prices were limited to 4s. 9d. within the lighting district of the Corporation, and 5s. 3d. without—that is, we charge 6d. more where there are no public lamps. The principal clauses in the Act were settled by agreement with the Corporation, who had also introduced a Bill in the same year, for the erection of gas-works in competition with ours, but this Bill was subsequently withdrawn. The prices proposed to be charged by the Corporation were 5s. within the borough and 6s. outside. The present number of Shareholders in the Company is about 250, and the capital £150,000. Since 1868 our gas consumption has increased but slowly as compared with that in English towns. During the years 1870-71-72 the Company paid a dividend of 8 per cent., but in 1873—the year of the coal famine—they only paid 6 per cent., but the difference was subsequently recouped to the Shareholders. In consequence of the continued high price of coal, an application was made to the Board of Trade, under the Gas and Water Works Facilities Act, 1873, for a Provisional Order to enable us to increase the price of gas, and Mr. Vernon Harcourt was appointed to hold an inquiry, at which we were opposed by the Corporation. Mr. G. W. Stevenson, who was one of the witnesses for the Corporation, contended that our unaccounted-for gas was excessive; it amounted to 20 per cent., while the Corporation stated that it only ought to be 10 per cent. Mr. Harcourt, however, in his report, intimated that under the peculiar circumstances existing in Cork, he thought 15 per cent. would be a fair allowance. He also allowed us to make an additional charge of 6d. per 1000 feet for two years, and this we accordingly charged in 1874 and 1875, during which period we declared a dividend of 5 per cent., which was all that was allowed under the temporary Act above mentioned. In 1876 we paid 8 per cent.; and in 1877, 8 per cent., and 2 per cent. additional to make up the deficiency in 1873. Previously to 1873 we had a reserve-fund, but this was consumed in consequence of the advance in the price of coal. It fell from £5224 at the beginning of 1873 to £371 in 1874; but it has been increased again since that time, and the last accounts show an item of £10,821 4s. 6d., in which interest is included, the fund being invested in railway and harbour debentures, both of which are thoroughly sound. Our present price is 4s. 6d. within the lighting district, and 5s. beyond, in both cases exclusive of meter-rent. The contract for the public lights at the end of 1879 was at the rate of 4s. 3d. per 1000 feet, calculated on the average meter system, one meter being attached to every tenth lamp. We also contracted to do all necessary repairs for 3d. per 1000 feet. The metered lamp ought to be arranged as the middle lamp of the ten, but it was reported by our Manager—Mr. Travers—that such was not the case, and last October we had an interview with the Corporation upon the subject, and sent them a copy of Mr. Travers's report, to which we did not receive any reply till last month. The lamps are lighted by the servants of the Corporation, and the effect of lighting the metered lamp last is to make the ten lamps appear to burn much less than they really do. At our interview all the members of the Corporation who were present were as strong in condemning the system—if it could be proved—as the Directors themselves were. The contract with the Corporation expired in 1879, but in the previous October we opened negotiations for its renewal at the old price of 4s. 3d. per 1000, although we objected to the 3d. for repairs, as we found it did not pay our expenses out of pocket. We offered, however, to do all the repairs for the actual sum expended for labour and materials; but on that matter no conclusion has been arrived at, and immediately before the appointment of this Committee we withdrew our offer. At the present moment, therefore, there is no contract for the public lighting of Cork. We furnished the accounts for the quarter ending April 1 at the price of 4s. 3d. per 1000 feet, and we also added the amount expended for labour and materials for the repair of the lamps. The account was returned to us for the quantity of gas consumed, but the Gas Committee informed us that they were not prepared to sanction any increase upon the former price charged for repairs. The first suggestion in reference to the sliding scale came from the Corporation at the meeting to which I have referred, and it was then agreed to by the Company. The lamps and lamp-posts are the property of the Company, and the Corporation have not in any way contributed towards their cost. In a pamphlet issued by Mr. Stevenson, he says that no objecton can be made to the amount of additional capital proposed to be raised, nor to the mode to be employed; but he goes on to say that a differential price within and without the borough is unworkable under the sliding scale, though I cannot conceive how he can have arrived at such a result. There are in the pamphlet other charges which are also embodied in the petition against the Bill—viz., that the Company do not make a sufficient quantity of gas per ton of coal carbonized, that the unaccounted-for gas is excessive, and that the cost of manufacture is too high; but all these allegations are based upon a comparison with the London Companies. The petition states that the London Companies produce 10,180 cubic feet per ton of coal, whilst the Cork Gas Company produce 8960, showing a difference of 1220 cubic feet; but during the year in which Mr. Stevenson made the comparison we were using about 25 per cent. of cheap Welsh coal, the remainder being from Newcastle, and with this combination we have produced gas of the quality required by our Act of Parliament—viz., 14 candles. The Corporation have a testing officer, and the gas is tested every day, but we have never had any penalties exacted from us, nor have we had a single complaint for some years past as to the illuminating power. The Directors have always instructed the local Engineer to give a good quality of gas, and to be well above the standard he was bound to give. With regard to unaccounted-for gas, Mr. Stevenson says ours ought to be reduced to 10 per cent., and he compares it with London, where it is only 6 per cent. It would have been more natural to have selected Dublin, Belfast, Londonderry, Limerick, or some other town in Ireland. His calculation is founded upon an utterly erroneous basis. Suppose on a mile of main, for instance, there is a consumption of 2 million feet, while only 1,600,000 feet are delivered, this would be a waste of 20 per cent.; but if the consumption off that main be doubled, the unaccounted-for gas will practically remain the same, although the percentage will have fallen off. The centre portion of Cork consists of a number of small islands, and formerly there were a series of canals, with trees on either side; but subsequently these canals were covered over, and, in fact, they at present form a great part of the main sewers of the city. The locality rests upon a substratum of turf, and in consequence the ground is extremely unstable; so much so that the cars passing through the streets will make everything vibrate. Outside the city, the outlying districts rise to a great height, the barracks being nearly 300 feet above the city. The consequence is that if we are to have a sufficient pressure at the lower parts we must have an excessive pressure at the higher parts, thus causing a large amount of leakage. There is also this disadvantage, that the mains after rising have to descend again; and if we introduced street governors there would be no gas where the main descended again. The item of leakage does not include the gas consumed on the works, because this is charged separately. I believe, if we had anything approaching the consumption of London per mile of main, our leakage would not be more than 6 per cent. The great extent of mains in an Irish city like Cork cannot be utilized as they are in London, because of the great poverty of the population, and the very small number of persons who can afford to burn gas. The early closing movement also prevails very much in Cork. With the exception of public-houses and a few other shops, all establishments are closed at six o'clock, except on Saturdays, when they remain open till eleven, the result being that the pressure remains in the pipes at full supply in order to satisfy a comparatively small number of lights. I believe were it not for this cause our leakage would be 2 or 3 per cent.

less than it is. The only manufactories we have in Cork are three distilleries, four breweries, and two or three small foundries. On Mr. Stevenson's third point—the expense of manufacture—the first error I think he makes is one of arithmetic. He compares the expenses of London and Cork upon the number of feet of gas sold, which is certainly a mistake. He admits there must be more unaccounted-for gas in Cork than in London, which gas cannot be produced without labour, wear and tear, and so forth; and therefore the comparison should be between the expenses per 1000 feet of gas sold, and not per 1000 feet made, in which case, with certain allowances, it would be in favour of Cork. There was one circumstance of which Mr. Stevenson certainly had no knowledge—viz., that the cost per 1000 feet in Cork is greatly increased by the enormously high taxes which have to be paid by the Company. In the two half years ended Dec., 1878, and June, 1879, the rates upon the gas made in Cork amounted to 3·49d. per 1000 feet, while in London, in 1878, they were only 1·47d., showing a difference of over 2d. per 1000 feet. Another matter to be taken into consideration is that in Cork all our holdings are under fee-farm grant, upon which an annual rent is paid, instead of being purchased with capital. We pay £300 a year, which at 30 years purchase—although we have no compulsory powers of purchase—would amount to £9000, and I put this down as an equivalent upon the gas made in Cork at 0·9d., making a difference of 3d. in round numbers, which appears in our expenses at Cork, but does not appear amongst those in London. In addition to this I find that in London the repairs of meters do not appear among the expenses, and for this reason—there is an item for meter-rent placed on one side of the account, and on the other side the repairs and renewals of meters. The result is that the meter-rent pays for more than the repairs and renewals, and allows a small profit, which does not appear at all. I say we are entitled to 1·89d. for this, and those various items show that there are charges we have to bear in Cork, as compared with London, of 4·81d. The London charges for revenue are 16·9d. per 1000 feet, which comes to 15·96d. for their expenses, and if to this is added the 4·81d., which I say we are entitled to consider in any comparison of expenses, the total in London comes to 20·77d., whereas in Cork the expenses to which Mr. Stevenson has referred are 19·30d. taken upon every 1000 feet of gas made—not consumed. The consequence is, as I make out, that our expenses in Cork per 1000 feet of gas made are 1·47d. less than London if they are fairly compared, and the two places reduced to equal terms. In explanation of my statement that our rates are very high, I may state that the general valuation of Cork is a very old one, and has not been revised, while the valuation of the gas-works has been revised several times, the consequence being that we are rated to the full amount. To give an example, I have a tenant who pays me £50 a year rent, but the valuation of his premises is only £22 a year, whereas if he were valued in the same way as the Gas Company, it would be at least £44. The consequence is that if there were a revaluation in Cork, the gross amount would become so much that we should come down in the standard; but at present we have been valued and revalued where the old valuation could not be changed. I do not mean to say it is an exorbitant charge on the part of the Corporation, but the rates are remarkably high, in consequence of the differences in the valuation. Our office expenses are proportionately heavier than they are in London, in consequence of the smaller number of consumers. There has been a diminution in the unaccounted-for gas within the last few months, owing to the large outlay incurred by the Company in taking up service-pipes and relaying them in an asphalte composition, and by an examination of all the mains in order to discover the leaks. In some portions of the city, where the leakage went up to over 19 per cent., this was actually caused by the steps we were taking to diminish it in the future, because in breaking the connections and inserting new services, a certain amount of gas always escapes. It is now about 15 per cent., which I think is as low as it ever will be on an average in Cork, unless there is an increase in consumption; if this were doubled, our leakage would go down to 7 per cent. I have seen the petition supposed to be signed by the consumers, but some of the persons who have put their names to it are not consumers at all; and some of the leading members of the Ratepayers Association pay neither rates nor for gas, for they do not reside in the city at all. Six per cent. of the gas-rental is paid by the persons whose names are attached to the petition, but of those two or three have told me that they did not sign, and that their names were placed there without their consent. The annual value of the consumption of one gentleman who signed is 18s.; but there are several others higher than this. I think the standard price of 4s. 6d. inserted in the Bill is fair and reasonable, but it would have to be reduced to 3s. 10d. without the meter-rental before we could pay 10 per cent. dividend. The standard price in London is 3s. 9d., The Gaslight and Coke Company charging 3s. 5d., and, under the sliding scale, paying 11 per cent., in consequence of having reduced the price by 4d. With regard to freights for Newcastle coal, and a comparison between Cork and London, at the present moment they are extremely low, and convey no test at all; but any one looking at the map, and seeing the distance between Newcastle and London, and the navigation all round the South of England to Cork, would know they must, in ordinary cases, be higher to the latter than to London. A vessel of 1200 tons would take five days to discharge in Cork, whereas in London, with hydraulic machinery, it can be done in a single day, and of course this would require a much higher rate of freight.

Cross-examined by Mr. GRANVILLE SOMERSET: The harbour dues in Cork are only 1d. per ton, but there are some small Mayor's dues besides. Conveying coal from the harbour to the works costs 8d. per ton for carriage and 4d. for trimming. In the original prospectus of the Company it was stated that the dividend was to be restricted to 8 per cent., and that any excess should go towards a reduction in the price of gas. Subsequently, in 1864, an attempt was made by the Company to extend the dividend to 10 per cent.; but the inhabitants became greatly dissatisfied with the breach of faith thus contemplated, and the Directors were requested to summon a meeting of the Shareholders on the subject, at which the original limitation of dividend was restored.

Mr. RICHARDS inquired if it was worth while discussing matters which occurred previous to the Act of 1868.

The REFEREE said that technically the cross-examination was in order, but the Committee felt that going so far back into the history of the Company was rather out of the way of the issue now being tried.

Cross-examination resumed: I am not aware whether the Gas Companies south of the Thames charge meter-rents, but I know some of the London Companies do so. The Gaslight and Coke Company receive £36,000 a year from this source. The population in the municipal borough of Cork is 80,000, but in the parliamentary borough it is 100,000, because a portion of the latter runs a good way into the country.

Mr. SOMERSET: Mr. Stevenson, in his pamphlet, states that from June, 1878, to June, 1879, "21,558 tons of coal were carbonized, showing 8960 feet made per ton and 7231 feet sold." He then adds: "These figures are so startling that I venture to say that there is scarcely a Company in the United Kingdom working so badly as the Cork Gas Company." What do you say to that?

Witness: My opinion is diametrically opposite.

That does not embrace London alone, but the whole of the United Kingdom? What place would you like to compare with Cork?—I should think the most convenient place would be Dublin or a town in the South of Ireland; but I do not know of any place which is exactly similar in circumstances.

Cross-examination continued: At the present time the Company have about 700 shares unissued, representing £3500, and also certain borrowing powers. The contract between the Company and the Corporation was not renewed, because the latter refused to pay more than the 3d. for repairs which had been previously agreed upon. If we obtain our Bill we shall have to consider what fresh terms we shall make, and in case of non-agreement the price can be fixed by an arbitrator. During the two years in which we divided only 5 per cent. we were under the provisions of the Gas and Water Works Facilities Act, 1873, but this Act has since expired. The opinion of our Board was that we were not entitled to divide more during that period, although some lawyers were of opinion that we might have done so. The Directors, however, thought that, whether legally or not, they were not morally entitled to take that course.

Mr. SOMERSET: Under the Act of 1868 the Corporation appointed one of the Auditors of the Company, and in August, 1879, the Corporation Auditor said: "After having gone into every sort of calculation, I respectfully submit that the consumers have an equitable if not a legal right to participate in the surplus profit." Were the consumers affected to such an extent as to act upon that suggestion?

Witness: By adopting the sliding scale the consumers will participate in the profit. We have already reduced the price from 4s. 9d. to 4s. 6d. to the public, and 4s. 3d. to the Corporation. It does not say the consumers shall have the whole of the profit, but that they shall participate. The effect of the sliding scale is that any future additional profits we can make are to be divided in the proportion of two-thirds to the consumers and one-third to the shareholders.

Cross-examination continued: The balance at the foot of the profit and loss account for the last half year was £6324, out of which we paid our full dividend, and carried £908 to the reserve-fund. There was also an insurance-fund item of £200; depreciation-fund, £700; and a suspense account—in a case where a banker had failed—£438. In explanation of the latter item, I may state that a former Accountant had run away, taking money from us which was afterwards recovered. Considerable expenses, however, were incurred, and among other things our correspondents abroad, who had been authorized to seize the man, had bills upon a firm called Bowles Brothers. The money was remitted to us, but before the bills arrived in Cork the bank failed, and we kept the amount in the accounts for a long time, expecting to receive a dividend out of the estate; but finally, finding this was not likely, we thought it ought not to be put down any longer as a realizable asset, and therefore it was written off as a loss, and comes out of the reserve-fund.

Mr. SOMERSET: Out of the consumers fund?

Witness: Possibly, in the end.

How much did that gentleman run away with?—£2700.

That came out of the pockets of the consumers?—No; he was arrested in Geneva, and the money was found upon him.

But you cannot reduce your rates if you let your people run away with £2000 or £3000?—Very much worse things have happened in the London Companies. So far as this item was concerned, it was simply an accident to which all commercial companies are subject—viz., failure of the bankers.

At a meeting held last week did you not say that you did your work better than the London Companies, and that you were prepared to supply gas at 3s. 9d. per 1000 feet?—I said we could give London prices, London dividends, and London illuminating power, if we had, as they have in London, meter-rents, and in addition to the London price the excess of rates in Cork per 1000 feet to be determined by any auditor who should be appointed.

Did you not say that you could pay 10 per cent. with a price of 3s. 9d. per 1000?—I said I proposed a scale that would allow us to pay 10 per cent., but I did not say we could sell gas at 3s. 9d. per 1000. I pledged myself that the Company could reduce the price to 4s. 2d. per 1000 from Jan. 1 next, but I did not say they could therefore pay 9 per cent.; and if they did perhaps the only way they could do it would be by taking it out of the reserve-fund.

You are reported to have said, "The proposal was to supply gas at the same price as the Chartered Gas Company in London—viz., at 3s. 9d. per 1000 feet, with 10 per cent. dividend, 5s. per cent. reduction for every penny added to it, and 5s. per cent. increase for every penny charged under it"?—Yes, that is perfectly correct.

THURSDAY, JUNE 17.

Mr. *Denny Lane* was recalled and cross-examined by Mr. YOUNG as to the position and amount of consumption of the parties who had signed the petition against the Bill.

Cross-examined by Mr. CLIFFORD: In the half year ending December, 1879, the cost of coal from Newcastle, including freight, was 7s. 9d; exclusive of freight, 6s. 8d. The previous half year it was 6s. 3d., and the half year before that 6s. 5d. I cannot give the freight of Welsh coal, but the cost delivered into the stores in December, 1879, was 10s. 8d. against 13s. 9d. for Newcastle coal delivered into the stores. Those sums do not include the expense of wheeling the coal from the stores to the retort.

By the REFEREE: In the year 1876 the average price for all our coal was 14s. 10d.; 1877, 14s. 3d.; 1878, 13s. 3d.; and 1879, 12s. 10d. During the greater part of this time there was an extraordinary depression in the coal trade, and also very low rates of freight; so that those years cannot be taken as a test. In 1868 the price was 13s. 9d.; 1869, 14s.; 1870, 14s. 6d.; 1871, 15s. 3d.; 1872, 17s. 9d.

The REFEREE: Then you must have been beginning to feel the coal famine when you reached 17s. 9d.?

Witness: When we put down that coal we had no stock, but it was before the famine. We frequently had contracts running, and bought the coal before it was required.

By Mr. CLIFFORD: During the period mentioned we were using a much larger proportion of Welsh coal than we do now.

By the REFEREE: During some of the years I have mentioned we did not use any Newcastle coals; in one year we only used 97 tons; in another only 57 tons; and in another 146 tons; so that the prices I have given were for Welsh and Wigan coals, not Newcastle. The freights and prices of Newcastle coal were so high that we found it more advantageous to use a mixture of Welsh and Wigan coals. In the course of five years we only used about 3000 tons of Newcastle coal out of a total of nearly 120,000 tons. The Wigan coal was very deficient in coke, but the Welsh coal gave a large proportion. As a general rule, whenever a coal gives a large quantity of gas it gives a small quantity of coke. Taking both gas and coke into account, Newcastle coal is the best; but for coke some of the Welsh coals exceed it, while for quantity of gas and illuminating power the Wigan coal exceeds it.

Mr. *George Anderson*, examined by Mr. MICHAEL.

I designed the works of the Cork Gas Consumers Company, and have been Engineer since that time. I visit the works several times in the course of the year. I have read the report presented to the Corporation of Cork by Mr. Stevenson, in which a complaint is made that the pro-

moters of the present Bill do not manufacture gas so cheaply as it is done in London, and I was surprised at it. The comparison is not fair, and when I come to the estimates I have prepared I will prove it. Mr. Stevenson has only taken part of our expenses, and argues from these as if they were the whole. He only takes the revenue account, and leaves out all the expenses in the profit and loss account, and by so doing he brings out his price to something like 3s. 6d. per 1000 feet. It is notorious that the business of the London Companies is vastly greater than that of the Cork Company, and in consequence it is easier to sell the gas at a lower price. I have prepared a comparison of the leading items of the manufacture of gas in London and in Cork. According to Mr. Stevenson's report, he takes out figures as to the actual cost of our coal, which are quite correct, amounting to 5·30d. per 1000 feet of gas sold. He also takes the expenses of our revenue account, which includes stokers and purifying men. Then he takes the expenses which are found in our revenue account, amounting to 23·98d. per 1000 feet, and also our interest on shares and debentures, amounting to 17·62d.; and these together work out to 46·90d. Among the items which Mr. Stevenson omitted to take was one of "Bank charges, £328 13s. 4d." We have a small working capital, and the bank allows us to overdraw, and they charge banking interest. Then there were general charges amounting to £651 3s., and a payment of £91 0s. 9d. for insurance. There is also the item of £24 13s. 5d. for law expenses; and "bad debts and allowances" are omitted, which amounted to £196 2s. 1d. The total of the items omitted amounts to £1291 12s. 7d., or 1·98d. per 1000 feet.

Mr. CLIFFORD: Is this per 1000 feet sold or manufactured?

Witness: The figures I am now laying before the Committee are for gas manufactured. The expenses in the profit and loss account, and in the balance-sheet of the Company are also omitted by Mr. Stevenson. In the account to June, 1880, we placed £200 to insurance, and £800 to depreciation—equal to 1·54d. per 1000 feet of gas made. If those items are added to the sum Mr. Stevenson arrived at before these were calculated, it brings up the price to 50·42d. per 1000 feet.

Examination resumed: The difference between my estimate and that of Mr. Stevenson is about 11·40d., which I think is under the mark. The estimated cost of the gas is on a basis of coal at 14s. 4d. per ton, with a production of 9800 feet. I am aware this price is a little higher than we are paying at present, but not higher than we must expect to pay in the future, and not so high as we have paid in the past, irrespective of the coal famine. In 1870 and 1871 our average price was about 15s. 8½d. delivered in Cork Harbour—that is, Newcastle coal—to which must be added insurance of the coal, seaport dues at Cork, and a small gratuity to the captain, amounting to 2½d. Then there is the cartage to the works and the weighing and trimming, which I have taken at ½d. Mr. Lane has given the figure at the present time as 1s., but this is 50 per cent. under the price other companies are paying for similar work, and it would be unsafe for any company to be limited to such a low price as Mr. Lane is working at. The price is thus brought up to 17·61d. per 1000 cubic feet; and then there is the labour in the retort-house, coal stores, purifying-houses, &c., which I take at 5·50d.; wear and tear of retorts and works, 3d.; purifying materials, ½d.; and water, oil, and sundries, ½d.; amounting in the whole to 27·11d. Then we get something back for our residual products, which I take at 60 per cent., and which is a high amount to receive, because when Welsh coals are used a larger quantity of coke is obtained, and therefore the residual products are larger than they would be if we were using a better class of coals. This amounts to 10·56d., leaving the net cost of gas into the holder at 16·55d. The gas has then to be distributed to the consumers, and I require for the wear and tear of mains, services, and meters 3d., and expenses of public lighting 0·80d. per 1000 feet. We actually pay for rents £314, and rates and taxes £490, which amounts to 3·37d. per 1000 feet. We pay salaries to the amount of £1950, equal to 2·34d. per 1000; and general office expenses £450, equal to 0·54d. per 1000. All the items I am giving the Committee are actually extracted from the accounts. Then I want for Directors and Auditors £390, which is equal to 0·47d. per 1000; and there are also general charges, £445; insurance, £72; bad debts and allowances, £300; law expenses, £20; and allowances on disputed accounts; the last five items amounting to 7·72d. per 1000 feet. Then I take the interest paid to the debenture holders—£20,000 at 5 per cent.—which is 1·20d. per 1000 feet. The shares are £135,000, which at 8 per cent. amounts to 13d. per 1000 feet. I also allow for the renewal-fund 3d. per 1000 feet, which is a low sum, because in our case the whole of the meters are given free to the public. We have £10,000 worth of meters, and we know they will not last for ever; and I consider no company is safe, under those circumstances, unless they put aside something for meters, even beyond the ordinary repairs. Meters will last from 15 to 20 years if they are well cared for; but if they are put into a damp place, or where there is salt, they will be rendered useless perhaps in half a dozen years. Besides the meters, there are also our two holders, our main and service pipes, and, in fact, all our works. I may observe that 3d. is less than the statutable deduction we were allowed on a recent occasion when our rating was under examination by the valuators in Dublin on behalf of the Government.

Mr. MICHAEL: Is it the proper course of conduct that when any renewal takes place it should be charged to revenue?

Witness: I do not think so. Wear and tear from year to year should be charged to revenue.

Where a new thing is taken for enlargement, the measure of the enlargement is charged to capital, but the replacement is charged to revenue?—That is the proper way of doing it, otherwise the capital will get in excess, and the consumers will be charged a price for gas which they would not otherwise be.

I wished the Committee to understand that you are charging against your Company in the interest of the consumers?—I am doing so, but I think it is the right thing to keep the capital down as much as possible.

Examination continued: For the renewal-fund I want 3d. per 1000 feet, the total then being 45·27d. We have manufactured our gas, and have put a certain quantity into the holders, but we do not get paid for all this. I have assumed that we shall receive payment for 85 per cent., allowing 15 per cent. for unaccounted-for gas, which is lower than it has ever been in Cork. This amounts to 53·26d. as the cost of the gas at the consumers meters, or 4s. 5·26d. to be charged. I have not asked for anything for contingencies which might arise, or for a reserve-fund. If we had to pay for coal the same price as we did 10 or 15 years ago—viz., 17s. per ton—taking everything else in the way I have now done, the price of gas would work out to 4s. 9d. per 1000 feet. Mr. Stevenson having compared our Company with London, and London only, I have considered it advisable to examine the London Companies accounts, and see how far his statement is correct, that it costs us 7d. per 1000 feet more to manufacture gas than it does the London Companies; and among others I have taken The Gaslight and Coke Company, which is the more adverse to myself, being so extremely large. I take 5½d. for labour, 3d. for works and repairs, and 3d. for outside repairs, making 11½d. I also lay before the Committee my extract of the London Companies accounts for the same items that are included in this 11½d., and it will be found that we are not excessive in our cost of manufacture. My summary shows that while the London Companies paid 11·92d. per 1000 feet for these items, our expenses last year were exactly 11·03d., so that we are actually manufacturing gas cheaper than they do it in London. I may state that the cost of our clerks and office expenses altogether are more than double what they are in London, but not more than they arew with other companies similarly situated to ourselves and of like magnitude, and this is a reason for our having a higher price in Cork than in London.

Mr. MICHAEL: Of course the same servants are required for a large company as for a small one. You cannot divide a secretary or an inspector of meters, and so on?

Witness: Just so; but it goes much farther than that. Our consumers are numerous—perhaps 4000 or 5000—but there is a very small consumption. We have to make out accounts to some gentlemen who only consume 8s. worth of gas in the year.

Examination continued: We pay great attention to all complaints which are made; in fact, we do for the consumers in Cork what is not done in London. If a consumer in London makes a complaint, the Company simply look at the meter, and if it is all right they say they have performed their duty; but we have a staff of men who go right up to the burner, and we make no charge for this. I find that some companies out of London—viz., at Hove, Dover, and Brighton—do the same, and I have the accounts here. One pays 12 per cent. of the cost of coals on account of salaries; another pays 16, and another 20. The average of the whole is 17 per cent., while in Cork it is 16·6, which is a shade under. The Surrey Consumers Company pay only 9·9 per cent.; the Commercial, 6·5; Crystal Palace, 6·16; and The Gaslight and Coke Company, 4·7 upon the cost of the coal for the whole of their salaries, and this shows that the amounts vary exactly according to the size of the company. The average of the London Companies amounts to 7·9 per cent., and I consider we are entitled to a higher price for gas in Cork on this account alone.

Mr. CLIFFORD: Do those figures include Directors fees?

Witness: Yes; and so do those I have given for ourselves of 16·6.

Mr. MICHAEL: You have compared like with like in your own and other companies?

Witness: That is exactly what I have done. In our last year's accounts there appears only about £149 for purifying materials. Mr. Stevenson accepts what is excessively low, but does not say a word about it, and he would, I suppose, fix us for ever. There were peculiar circumstances, however, in that year, because for some time past we had been buying a large quantity of purifying material, and we were working upon that. In Hove, Dover, Brighton and South Shields, where the Gas Companies are all pretty large, the percentage of the cost of purification to the cost of coal is 3·16, and in London it is 3·75, while in my estimate before the Committee I have only taken 2·46.

Examination continued: With regard to the allegation that we do not make sufficient gas from our coal, I think Mr. Stevenson may have been misled on this point. He seems to have had London on his mind all through his report, and no doubt in London they do make a very large quantity of gas from a ton of coal.

Mr. MICHAEL: Do they use the same coal in London?

Witness: This is what, perhaps, Mr. Stevenson does not know. He took it as Newcastle coal, whereas we have for a number of years used a large quantity of cheap Welsh coal, which produces less gas but a great deal of coke. If we can get Welsh coal at 3s. per ton under Newcastle, we may then use either one or the other, but if the difference is greater use the Welsh in preference.

Is it a fact that there has been great progress in the manufacture of gas during the last ten years, so that a much larger quantity per ton of coal can be obtained now than was formerly the case?—That is a statement in Mr. Stevenson's report which I deny. I am an old man now, but I have been at the gas-making trade ever since I was a boy, and I say that we knew as much about the manufacture of gas—so far as the quantity to be obtained was concerned—20 years ago as we do now. At that time, however, there was not so much taken out of the coal as we now get. In Cork we are content to take rather less out of the coal, and prefer a good quality of gas rather than squeeze the coal to the last dregs, when it would follow as a necessity that the illuminating power of the gas would become diminished.

Examination continued: The Company have done their best to supply a good article; sometimes it has been 16, sometimes 16½, and sometimes 17-candle illuminating power. Our gas is, I believe, tested daily by the Corporation; at all events, I know that it is done very often. The freightage has been so excessively low for the last year or so that I know shipowners who have only been running their vessels because if they laid them up they would have heavy expenses upon them. I have been a shipowner myself, and once had, with some other gentlemen, four ships, and we could never run those vessels to Dover under 6s. per ton, while we have had vessels go to Cork as low as 5s., although I must admit they were chance vessels. The freight to Cork used to be about 1s. 6d. above Dover, and 2s. above London. I do not think it likely that our present low average in respect of coal and freight will continue; in fact, for the sake of the nation, I should hope it would not. We have taken great pains with the purification of our gas; indeed, I think we have been before the London Companies in this respect. Our shares are mainly held by consumers of gas in Cork; our proceedings are public; and our accounts are examined by the Corporation Auditor. I consider the price of 4s. 6d. per 1000 cubic feet asked for ought to be obtained from the Committee; otherwise I do not see the slightest use of the Bill. We are an 8 per cent. Company. It is true we promised in the first instance that we would not divide more than 8 per cent., though at that time we also stated that the price of gas was to be 5s. 6d. per 1000 feet; but instead of this we have supplied at 4s. 6d. per 1000 all along. The consumers obtained their gas at 1s. per 1000 below what they expected for a number of years before the Company took the step of wishing to alter their Articles of Association and get 10 per cent. We canvassed the town before we built the works, because we did not wish to work unsafely. We had 900 consumers who agreed to take our gas for a number of years at 5s. 6d. per 1000, instead of which we started at 4s. 6d. because of our success. In Dublin the standard price is 5s. per 1000, although I see that in 1871 one of the Companies then supplying that city obtained their Bill at 5s. 6d. for two years, when it was reduced to 5s. 4d., and afterwards it remained at 5s. The Londonderry Company in 1877 obtained their Bill with 5s. 9d. per 1000. The Waterford Company in the same year were allowed 5s. 9d., with 15 per cent. off. The Limerick Company in 1878 obtaining 5s. within the city, and 5s. 6d. outside. We ask for 4s. 6d. only, which is below the whole of these parallel cases. I am not going into instances where a company is small, or where there are any circumstances which would militate against an estimate, or else I might show a much higher price—it would be 7s. If the 14-candle gas were raised to an illuminating power of 16 candles, it would entail an expense of 3d. or 4d. per 1000 feet. I must say I should prefer to give a little higher price and have a little better gas.

Cross-examined by Mr. CLIFFORD: Unless the sliding scale applies to the Companies I have quoted, the prices I have mentioned are the maximum prices; but I contend that 4s. 6d. per 1000 is our maximum price, although we have the sliding scale, inasmuch as if we increase beyond this sum we shall suffer in our dividends. I do not know the actual price at present charged for gas in Dublin, but it may be 3s. 11d. per 1000; and

this only shows the necessity of some margin being allowed to us. Companies lower their price when they can do so, in order to meet their exigencies when coals and other things are high. I am aware that the quality of the gas in Dublin is 16 candles.

Mr. CLIFFORD: Two candles difference in illuminating power is equal to a difference of 3d. or 3½d. per 1000, is it not?

Witness: It may be somewhere about 3d., I think.

That is a difference of 3½d. as regards Dublin compared with Cork in the price charged?—Yes; but the consumption in Dublin is about six times as much.

Cross-examination continued: The charge we propose to make for meters will add very little to our revenue. It will only apply in cases where there is scarcely any consumption. We say it is unfair to the general body of consumers that we should supply a meter to a gentleman who only perhaps lights his hall. In fact, there are cases where the amount received for the gas is not equal to the cost of the meter to us, and in those cases we want a small increase. In my estimate of 4s. 6d. per 1000 I have made no allowance for contingencies, nor for a reserve-fund.

Mr. CLIFFORD: You would be very much surprised, no doubt, at the statement of competent witnesses who say that 3s. 6d. per 1000 might be the cost?

Witness: I am not at all surprised at the statement, considering the quarter from whence it comes. I am a manufacturer of gas, and know the cost of it too well to believe any statement of that kind.

Cross-examination continued: I have dissuaded the Company from using Welsh coal unless they can obtain it at 3s. per ton lower than Newcastle. As an individual, I prefer Newcastle coal, but I do not say the Cork Company are not to use Welsh coal, because hundreds of companies do so. I have used it in Waterford, but discarded it there because it did not suit us so well. There are many nail-makers in Waterford, and they burn a great deal of coke, which must be clean and hard. The coke from Welsh coal is not so clean and hard as the Newcastle coke, and this is one reason for our adopting the latter coal. The practice in Queenstown is much the same as at Waterford, and so it is in nearly all my works.

By Mr. MICHAEL: The Queenstown Company reduced their price to 5s. 6d., on my advice, about three months ago. Their maximum is 6s. 6d. per 1000, so they are 1s. below the price.

Cross-examination resumed: The dividend at Waterford is 8 per cent. I should say the produce of gas from Welsh coal varies from 6000 to 7000 cubic feet per ton, if it can be obtained good, and from Newcastle coal 9800 feet. You can get 11,000 feet from it if you like to play with it, but I take it as a practical man, working at 9800 feet to make good gas. I know what the London Companies say they obtain, but they use a proportion of cannel coal, although I do not know exactly the quantity. In London they are drawing their coal from week to week the whole year through, and any one who knows anything about gas-making knows that if the coal is even a couple of months out of the pit it is greatly depreciated in quality. In the case of Cork the coal is sometimes three months at sea before it is delivered. We have to lay in a large quantity every October, to last a considerable time, for fear of not getting vessels, so that our coal is sometimes in the store for six months, and is depreciated, perhaps, 500 feet of gas in a ton. We have to deliver our coal into the stores, and then wheel it to the retorts; but in London—as in the case of The Gaslight and Coke Company—the coal is brought from the vessel direct, and put before the retort in one operation, which does not cost above one-third, I suppose, what it does in Cork.

Mr. CLIFFORD: Are you aware that the London Companies must keep a storeage of six weeks supply?

Witness: That is a very small quantity—we have to keep six months supply. But the London Companies do not do this, whatever may be the regulations; and on this point I speak from personal knowledge.

Cross-examination continued: The quality of gas manufactured in London is not better than that made in Cork. They have, however, a better burner in London, which gives a light equal to one or two additional candles.

By Mr. MICHAEL: With regard to the leakage in London and other places, the statements made by Mr. Stevenson are so rabid that a practical man pays no attention to them. Sometimes £5000 worth of gas is sold from a mile of mains in London, while you may have a dozen miles of main before you receive that amount in Cork. The quantity of leakage depends upon the main. If we were sending four times as much gas as we are doing now through a mile of mains, our leakage would be reduced to about 5 per cent. It is a question of business, not of percentage of leakage.

Cross-examination resumed: It is unlikely our leakage can be reduced below 15 per cent., because circumstances are very much against us. The sewers are within 2 or 3 feet of the surface of the roads, and it is difficult to find the escapes of gas. In London the sewers are 20 feet below the carriage-way, and the gas soon comes to the surface, so that the escapes are easily found. We generally lay our pipes in the summer or autumn, but sometimes we have had to lay them in the winter, when anything sudden has come upon us. In the spring we have a consultation with the Manager, and ascertain how he stands with respect to mains, and how the pressure is, and where there is a deficiency we look at the maps, and decide, perhaps, on an enlargement in a certain district. The matter is then brought before the Board, and the pipes are ordered, and we receive them as soon as possible afterwards. Speaking from a Shareholder's point of view, I should like to receive a dividend of 10 per cent. as proposed by this Bill, but I do not think it is possible; if we obtain 9 per cent. I think it is as much as we shall do, although I consider we are entitled to 10 per cent. There is no company I know of that has been so successful in its operations as the Cork Company, or that has been so well conducted, or has carried out its obligations to the consumer—and more than its obligations—in a better way.

Mr. CLIFFORD: The obligation to the consumer was to divide no more than 8 per cent.?

Witness: And we have never done so; but I should like to see that obligation removed.

Assuming you do not obtain your Act, you will not be able to divide more than 8 per cent, and when the limit of your reserve-fund is reached, the public will obtain the benefit of a reduced price?—That will depend upon whether things remain as they are, or whether they increase in value. If coal goes up in price—which it is doing at the present time—it is not likely there will be any reduction.

Is it not a fact that you are now laying by to the reserve-fund at the rate of £1500 or £1600 a year?—I am prepared to say we ought to put by a great deal more than that.

What is the limit to your reserve-fund?—That is another question altogether. You say we are laying by a large sum, and I say it is small.

I wish you would answer my question?—We give the meters free, and we ought to receive £10,000 from them.

I am not on the subject of meters now?—You are upon the subject of laying by money, and I tell you we ought to lay by more than we are doing.

If you lay by more than you are doing, the instant you reach the limit of that reserve-fund the consumers will benefit in Cork by reduced charges?—Yes, no doubt, if everything remains the same.

Mr. MICHAEL (in re-examination): The Corporation passed resolutions approving of the system of the sliding scale?

Witness: I must go farther than that. I was perhaps one of the first who was spoken to on this matter, and the inducement held out to me by the members of the Corporation was that we were to obtain more than 8 per cent., and that we were entitled to it if we reduced the price of gas.

Mr. YOUNG: I wish to ask only one question. Do you say that in every case when consumers have complained of the fittings being defective, you send men to repair them?

Witness: It is putting it very strongly, when you say in every case; but we keep a staff of officers—which are not kept in London—for repairing anything that is wrong. A consumer may perhaps begin with 5 or 10 lights, and go up to 20, 30, or even 40 lights, but he does not have the pipes inside his house increased in proportion; and in such case we send and tell him we cannot do anything unless he has his pipes increased, because the fault lies entirely with himself. With the exception of cases of this kind, every endeavour is made to see that the consumers have the opportunity of burning as much gas as possible, because we know this will be to our advantage.

Mr. *William Francis Cotton*, examined by Mr. MICHAEL.

I have been Manager and Secretary of the Alliance and Dublin Consumers Gas Company for seven years, and have had large experience in the manufacture and supply of gas. Our Company supply the city of Dublin, five townships outside, and one outlying district. I am acquainted with the Cork Gas-Works, and acted for the Corporation of Cork in the negotiations with reference to the present system of public lighting. In 1869 I laid down the present system of public lighting for the Corporation, and consider the Directors of the Gas Company acted very liberally to the Corporation on that occasion. The gas-works are well constructed, even as regards the old portions which were erected by the United General Gas Company. If the promoters used a coal from which they obtained 10,000 feet of gas per ton, it would cost them from 3s. to 4s. per ton more than they are now paying, and therefore one effect would neutralize the other. In Dublin we used 114,000 tons of coal last year. We charge 4s. 3d. per 1000 feet inside the city, and 4s. 6d. outside, running up to 5s., and also meter-rent. Our maximum is 5s., so that our price can be increased in case of a rise in the price of coal or iron. The average price of Newcastle coal, with a mixture of cannel, paid by the Dublin Company in 1873 was 28s. 10d. per ton; 1874, 28s. 3d.; 1875, 24s. 6d.; 1876, 21s. 2½d.; 1877, 19s. 10d.; 1878, 19s. 3¾d.; and 1879, 18s. 3¾d. The last two years have been exceptional, owing to the low rates of freight. During the past twelve months we have had vessels come to Dublin and Queenstown for 6s. or 7s. per ton, while about four years since we paid as much as 11s. I do not think these low rates of freight will continue; in fact, they have much increased during the present year. I think we are in as good a position as the Cork Gas Company for obtaining coal, with the exception that their freights are lower. I have prepared an estimate showing the cost of production, based upon a yield of 10,000 cubic feet of gas per ton from Newcastle coal, and it works out to 4s. 2d. without any allowance for depreciation or for reserve and insurance funds, all of which are essential to the good working of gas companies. I consider a gas company ought to be in a condition to earn in perpetuity the dividend they are entitled to divide among their shareholders, and that it is not properly conducted unless the works are kept in such a condition. I agree that all sums for replacement to exactly the same condition of things ought to be furnished by revenue, and that all new works for extensions and so on should be charged to capital. It would be an advantage to the consumers if the Cork Company were to obtain a larger dividend under the provisions of this Bill, because in that case there must be a corresponding reduction in the price of gas. The proportion per ton of coals and per 1000 feet of gas is very moderate compared with other provincial gas companies. Even compared with The Gaslight and Coke Company. the capital per ton of coal carbonized is £7 5s. 5d., while in the case of the Cork Gas Company it is £6 16s. 9d. Considering the district, I do not think the amount of unaccounted-for gas to be excessive. We have a district outside Dublin—called the Kingstown district—where we have made great efforts to reduce the unaccounted-for gas, and up to the present time we have not succeeded in bringing it under 18 per cent. I consider 15 per cent. to be very fair for Cork. At Kingstown the circumstances are similar to those in Cork as regards elevation. It is absurd to make a comparison between the large Companies in London and a small Company like that at Cork; in fact, I do not think they have done more in London to reduce the leakage, as regards looking after the mains and services, than they have in Cork. I do not think there would have been any saving to the consumers if the Company had adopted the more expensive plan of making a greater quantity of gas from the coals, because, owing to the low price, the one balances the other. I agree with Mr. Anderson that the working expenses of the Cork Gas Company are not enormous, as compared with the London Companies. With the sliding scale, if the price of coal increases, or another coal famine occurs, the Cork Shareholders will have to be content with a diminished amount of dividend. With respect to the clause proposed to be inserted in this Bill, giving the public an opportunity to hire stoves, fittings, &c., I think it is to the interest of the consumers that the Company should have that power. Last season the Dublin Company obtained authority to do similar work, and up to the present time we have supplied a large number of cooking and heating apparatus, which, of course, has caused an enlarged consumption of gas. At present we have in Dublin 42 gas-engines in use, and a large number of cooking apparatus.

Cross-examined by Mr. CLIFFORD: We propose to reduce the price of gas in Dublin City next September to 3s. 11d. per 1000 feet, but in the outlying townships the price will vary from 4s. 1d. to 5s. per 1000 feet. We do not use Welsh coal in Dublin; it is all Newcastle coal and cannel. We cannot sell coke in Dublin, unless it is of the very best quality, and we are therefore obliged to use Newcastle coal. I am aware that the Cork Company have a portion of unissued capital—about £16,000, I believe. I think it wise for a company, when applying to Parliament, to ask for powers to raise additional capital, in order that they may not have to make another application for several years. In the present case capital will be required for starting the new business—supplying cooking and heating apparatus—and extensions are always going on for which new capital is necessary.

Mr. CLIFFORD: What do you think of this opinion expressed by Mr. Stevenson: "The figures are so startling that I think I may venture to say there is scarcely a company in the United Kingdom making such bad work as the Cork Gas Company"?

Witness: I think Mr. Stevenson left out a good many items which he might and which he should have included.

Cross-examination continued: I should think the consumption of gas in Cork increases at the rate of about 6 or 7 per cent. per annum, which works out to about £700 or £800 a year.

Mr. CLIFFORD: With an increased consumption, the proportionate cost of working charges is reduced. Does not that point to a state of things, under the present law, which would give the consumers in Cork reduced charges—I mean assuming things to remain as at present?

Witness: Yes; of course it would.

And meanwhile, assuming they remain as at present, the dividend of

the Cork Company would be limited to 8 per cent., which they now divide. May I not take it, then, that the period at which this reduced charge would begin under the present state of things is near at hand?—That is provided coal and freights remain as at present, which, in my opinion, they will not do. At the present time we have to give an advanced price of 7d. per ton for our coals.

Cross-examination continued: When the present system of public lighting was adopted, I thought the way in which the meters were attached to the lamps was fair to both parties. The lamps were all numbered by the Gas Company by my directions.

Mr. CLIFFORD: You have said that the capital per ton in Cork was lower than it is in London. Does not that rather point to lower dividends in Cork than in London?

Witness: I do not see that it does.

Lower capital means the necessity of dividing a smaller sum?—Yes; it does in that way; and this is an advantage to the consumer.

Mr. MICHAEL (in re-examination): What do you think of this on the part of Mr. Stevenson: "No objection can be made to the amount of additional capital which the Company propose to raise, nor to the manner in which they propose to raise it, except in some small matters of detail which I have noted"?

Witness: I think he was wise when he gave that advice.

Mr. *R. P. Spice*, examined by Mr. MICHAEL.

I know the works of the Cork Gas Company very well, but I have not looked into their accounts, although I know they require further capital. I think the price asked for is a moderate one, and I agree with the previous witness as to the amount of capital it is judicious to ask the Committee to grant. I do not believe any injury can possibly occur to the gas consumers from such powers being granted, seeing that the capital will be raised in conformity with modern legislation under the auction clauses. There is no possible inducement for gas companies to expend capital before it is required; on the contrary, their object would always be to have as little new capital as possible, so that the dividend on the old capital might be assured. It is absurd to compare the manufacture of gas in a small concern like the gas-works at Cork with those in London. I do not think the working expenses of this provincial Company are enormous and excessive; but I think economy has been practised beyond what I should prefer to exercise. The Company buy everything as cheaply as they can, and they use Welsh coal. The peculiar circumstances of the case at Cork are such that the Company want the coke quite as much as they want the gas, and hence they use Welsh coal instead of Newcastle. There is no reason for saying that the conduct of the Company to the consumers has been such as to disentitle them to the consideration of Parliament when they apply for increased powers. I know nothing that they have been guilty of in the way of mismanagement which would conduce to anything like a fair reproach. The only way of getting an increased dividend will be by reducing the price of gas, and that is the inducement which modern legislation has given. If at the present time the Cork Company can pay their maximum dividend, as soon as their reserve-fund is full the price of gas must be reduced; but this presupposes that the present low rate for freight, coal, and all other materials continues. If, on the other hand, there should be an increase in the price of those articles, the matter will be left practically unaffected by the operation of the present Bill.

Cross-examined by Mr. CLIFFORD: I think Mr. Stevenson draws the line too stringently. I do not see why the sliding scale should not be applied to a company whose dividends are limited to 8 per cent.

Mr. CLIFFORD: Do you not see that one result of applying it would be to enable the shareholders to divide 10 per cent. instead of 8 per cent.?

Witness: They could only do it by lowering the price of gas.

Assuming the statutory limit of the reserve-fund is reached, the Company could then be compelled to reduce the price of gas, but they would not be able to divide 10 per cent.?—I do not know that they would. It is a case of management. By the present provisions there is an inducement to do the best as to management; but take away this inducement, and the consumers might not feel the benefit you anticipate.

Do I understand you to say that without a premium for good management there would be bad management?—I never said or thought of such a thing. You seem to be arguing for an inevitable result; but I say that this result may not be realized by the consumers.

But it may, and in that case the consumer reaps the advantage and the shareholder does not?—Yes.

Cross-examination continued: I prefer that every company should have a stimulus to good management, and this cannot be given unless they have the chance of an extra 1 per cent., which they may divide if they see their way to selling their gas cheaper. I consider 10 per cent. to be the ordinary rule; 8 per cent. is an exceptional state of things, and I therefore consider the consumers in Cork have been very well dealt with. I do not know that there is a clause in the Bill providing for purchase by the Corporation.

Mr. CLIFFORD: Assuming it to be so, would it not be a materal element, in case of arbitration, that instead of being an 8 per cent. Company it was a 10 per cent. Company?

Witness: If they were paying 10 per cent. they would obviously realize a higher price when they sold their undertaking, but they would not be paying then a penny more than the concern is worth.

Re-examined by Mr. MICHAEL: Under the old state of things every Shareholder was entitled to a *pro ratâ* allotment of shares when new capital was required.

Mr. MICHAEL: Therefore if the Cork Corporation had been going to purchase the gas undertaking, they would have had to buy not only an 8 per cent. dividend paying Company, but the probable prospective increase on the additional capital to be raised?

Witness: Quite so. The privilege of raising capital would have to be paid for, but by the auction clauses this is entirely abrogated.

The REFEREE: Taking the price of gas per 1000 feet, what would you reckon as the charge for meters?

Witness: It is generally about from 1½d. to 2d. per 1000 feet; but the Cork Gas Company do not charge for meters.

By the CHAIRMAN: The number of years a pipe lasts depends first of all upon the character of the pipes before they are laid, and then upon the character of the soil in which they are deposited. I have known pipes to be destroyed in 30 years, when they have been laid in a damp soil. I have taken my penknife and cut a piece out of a cast-iron pipe just as I would a piece of black lead. When the pipe was exposed to the air it became hard again, but whilst it was in that soft condition the gas would ooze through it, and occasion considerable loss. As to the age of pipes, authorities differ; some persons put the time at 80 years, and others say 100 years, but it depends upon the soil and the condition of the pipe. The worst soil in which to lay pipes is damp clay. The mains are laid in roadways, and as the houses are approached the pipes go across channels through which the surface water runs. That water percolates into the soil, and the service-pipes are sometimes damaged only at that point, while they are good elsewhere. This shows how much depends upon circumstances.

Mr. MICHAEL said this was the case on behalf of the promoters.

(To be continued.)

Legal Intelligence.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

MONDAY, JULY 26.

(Sittings in Banco, before the LORD CHIEF JUSTICE *and Justice* HAWKINS.)

REGINA *v.* BRICKWELL—REGINA *v.* MALCOLM.

THE EXTRAORDINARY CHARGES AGAINST THE DIRECTORS OF A GAS COMPANY.

The circumstances in regard to these cases must be so fresh in the minds of our readers that it will not be necessary to give the general outline of them as detailed by the learned counsel when

Mr. WEBSTER, Q.C. (with him Mr. CANDY), moved for rules *nisi* for writs of *certiorari* to remove any indictments that might be found in them from the Central Criminal Court to this Court for trial. He said that the prosecution had been instituted by two persons who were anxious to become Directors of the Tottenham and Edmonton Gas Company, and Mr. Brickwell, in his affidavit in support of the present application, swore that both of them had, prior to the prosecution, offered him and Mr. Malcolm that if they would retire from the Board the matters out of which the charges had arisen would be hushed up.

Portions of the affidavits filed in support of the applications having been read,

The LORD CHIEF JUSTICE said that the cases seemed to be very simple. Assuming the facts to be as stated, there would appear to be an end to the charges. He did not see why the cases should not be tried in the ordinary way at the Central Criminal Court.

Mr. WEBSTER said that if they were tried there it would be doubtful whether or not they would be heard before a Judge of a Superior Court; and there were points of law of some nicety which might arise as to the alleged fraudulent conversion.

The Court granted a rule *nisi* in each case.

MONDAY, AUG. 2.

Sir HARDINGE GIFFARD, Q.C., on behalf of the prosecution, to-day showed cause against the rule. He said that the case could well be tried at the Central Criminal Court, for it was as simple as simple could be, and involved no questions of law. Here were two gentlemen who from 1863 to the early part of this year had been receiving a supply of gas from the Company of which they were Directors, without any payment or any acknowledgment in the books of the Company that they received the gas gratuitously. Their defence—and he would admit that it was a good one if made out—was that they received the supply under a resolution of the Board of Directors, and although he could not admit that the Board had any such power, he would concede that if such a transaction as described had really taken place it would be an answer to the charge. But the case for the prosecution was that this statement was utterly untrue—that there was no record of such a thing having taken place, and no evidence in support of it except the statements of the defendants themselves and of the Secretary of the Company, who, if there was anything wrong, was a party to it.

Mr. WEBSTER, Q.C. (with whom was Mr. POLAND), in support of the rule, said that his learned friend had completely mistaken what he had said in moving for the rule. He had not stated that any resolution on the subject had been passed by the Board, but that when Mr. Brickwell, on changing his residence, had applied for a supply of gas, his co-Directors, in consideration of the great services he had for many years rendered to the Company, said, "Oh, Mr. Brickwell, you shall have your supply of gas free;" and this fact was deposed to by the Secretary of the Company. Under the Act this charge, if proved, constituted a misdemeanour which could not be tried at Sessions. He submitted that on the depositions there was no case against these gentlemen, but that as it was to be tried it should be tried in this Court. The prosecutor and another person who had taken these proceedings both admitted that they desired to be elected on the Board of the Company, and that they offered both the defendants that the whole matter should be hushed up if they would retire, which they declined to do. Mr. Brickwell had made an affidavit that the prosecution had been conducted in such a manner as prejudiced him in the eyes of the public; and that in order that the case should be tried in a satisfactory manner it should be tried before a Judge of the High Court of Justice and a special jury; and, further, that he desired to have the assistance of one of Her Majesty's Counsel. The learned Counsel proceeded to say that this was a kind of case which should be under the control of one of their lordships, and if one of them were going to sit at the Central Criminal Court, he should be perfectly satisfied to have it tried there. Their lordships would doubtless also think it right that when directors of a gas company were charged with fraud, they should be tried by persons in the same social position as themselves. These gentlemen were both advanced in years—one being 76 and the other 74 years of age—and there never had been a charge of this kind brought against them previously. He submitted that the rule should be made absolute. At the Old Bailey there would be no right of challenge to the jury.

Sir H. GIFFARD: No; but you can make the whole panel stand by until it is gone through, so practically there is a challenge.

The LORD CHIEF JUSTICE: If we give you a special jury, Mr. Webster, the charge will be hanging over these gentlemen's heads until after the long vacation.

Mr. WEBSTER: That is so, my lord; but we must consider the advantage of having it tried by a special jury.

Sir H. GIFFARD observed that the persons interested in the prosecution were Shareholders of the Company, and were desirous of ascertaining what it was doing.

The LORD CHIEF JUSTICE: But they do not deny that they desired these gentlemen to retire, in order that they might take their places at the Board.

Sir H. GIFFARD: If the Directors and the Secretary are improperly dealing with the gas, it is quite time that some one should interfere. One of these gentlemen is one of the six largest Shareholders.

The LORD CHIEF JUSTICE: That shows a strong prejudice; and, on the whole, the case had better go over until after the long vacation.

The rule for the *certiorari* was then made absolute.

YORKSHIRE ASSIZES—WEST RIDING DIVISION.

LEEDS, THURSDAY, JULY 29.

(Before Justice BOWEN *and a Common Jury.)*

ALFORD GAS COMPANY *v.* HOLMES.

This was an action to recover a register of Shareholders in the plaintiff Company.

Mr. WILLS, Q.C., and Mr. E. T. ATKINSON appeared for the plaintiffs; Mr. DIGBY SEYMOUR, Q.C., and Mr. WORMALD for the defendant.

It appeared from the statements of Counsel that the defendant was formerly a Director of the Company, and the plaintiffs now claimed from him the register of Shareholders, of which he became possessed in August, 1876, and damages for the retention of the same. In the statement of defence, the defendant alleged that he had not had the register;

or that, if he had, he took possession of it at the request of the Chairman of the Company, and afterwards returned it. The defendant was connected with the old Company, of which the present Company became the successors, the latter having been formed to purchase the works from the defendant, who had bought them. He was for a time a member of the Board of Directors of the new Company, and there being some question in dispute about shares, he asked to be allowed to take the register that he might examine it with the view of clearing the matter up. The Board, by resolution, decided to allow him to take away the register, and they had not since regained possession of it.

For the defence, it was contended that no actual loss could have been sustained by the detention of the book, for as limited companies are required to deposit a copy of their registers of shareholders in London, it would have been easy at any time to secure, by a small payment, a copy of the register.

Defendant, on being called, said he remembered that Mr. Casey, the Managing Director of the Company, wanted to take the book home, and that he (defendant) carried it for Mr. Casey to the station, where he gave it to him. He had not seen it since, while Mr. Casey had since died.

The other two witnesses examined included a son of Mr. Casey, who said that on one occasion he had seen in his father's house a book which answered the description of the register, but he had not since been able to find it.

The Jury returned a verdict for the plaintiffs, assessing the value of the book at £5, and the damages for its detention at 10s. 6d.

Justice BOWEN gave judgment for the plaintiffs for £5 10s. 6d., to be reduced to 10s. 6d. if the book were returned.

Miscellaneous News.

LEEDS CORPORATION GAS SUPPLY.

PROPOSED FURTHER LARGE REDUCTION IN PRICE.

A Special Meeting of the Gas Committee of the Leeds Corporation was held on the Monday of last week—Alderman BOWER in the chair—to consider the estimate for the year ending June 30, 1881. This showed that if the price of gas were reduced from 2s. 2d. per 1000 cubic feet—the present rate—to 1s. 10d., there would still be a balance of profit amounting to £5503.

After a long discussion, it was proposed by Mr. SCARR that the estimate be accepted, and that the Committee recommend to the Council to reduce the price to 1s. 10d. per 1000 feet from the 1st of July.

Mr. SPARK moved as an amendment that instead of reducing the price of gas, the profit shown in the estimate should be applied in reducing the sulphur impurities to a maximum of 20 grains per 100 cubic feet of gas, and abolishing meter-rents. Advocating the abolition of meter-rents, he pointed out that they pressed unfairly upon the smaller consumers, who represented about half the consumers in the borough, and who were charged at the rate of £3 per 100,000 cubic feet of gas used, whilst the larger consumers paid only 15s.

Several members of the Committee advocated the additional purifying of the gas, but the proposal to abolish meter-rents did not meet with approval, and on a vote being taken the amendment was lost.

Mr. CARTER then proposed that the price of gas should be reduced from 2s. 2d. to 2s. per 1000 feet, and that the gas be purified to a maximum of 20 grains of sulphur per 100 cubic feet.

After some discussion, it was agreed to divide the proposition; and, on a vote, that part relating to the price was lost, and the original motion that the price be reduced to 1s. 10d. adopted.

It was afterwards resolved that instructions be given to the Gas Engineer (Mr. Henry Woodall) to take steps for reducing the sulphur impurities in the gas to a maximum of 20 grains per 100 cubic feet.

In a letter to the *Leeds Mercury* the following day, Mr. Spark, referring to the unequal incidence of the charges for meters, as mentioned by him above, said: "Perhaps the anomaly will be better understood if put in another way. There are 6200 of the poorest part of our population who pay an average of 8s. per year for gas and meter-rent—viz., 2360 feet of gas at 2s. 2d. per 1000 feet, 5s.; meter-rent, 3s.; total 8s. For every 1000 feet of gas, therefore, which these people consume, they are called upon to pay no less than 3s. 5½d. In other words, 6200 gas consumers in Leeds pay a total per year of £2484, of which £1554 is for gas, and no less than £930 for measuring the same! Now as 3d. per 1000 feet on the total sale of gas would more than meet the full sum realized from meter-rents, it follows that a part of the gas consumers in Leeds are contributing 1s. 0½d. each, or £320 per year, for the benefit of the larger consumers."

METROPOLIS GAS SUPPLY.

METROPOLITAN BOARD OF WORKS.

At the Meeting of the Board last Friday the following report of the Parliamentary Committee was adopted:—"Your Committee have to report with reference to the Bill promoted by the Corporation of London relative to the testing of gas in the Metropolis, and the forfeitures to be incurred by the Companies for defective gas, that the Bill having been settled by the Board of Trade with the consent of all the parties, and having passed the House of Commons, is now before the House of Lords, and that a petition has been presented against it by The Gaslight and Coke Company. As, if this petition be maintained, there may be some risk of an alteration of the Bill which would be contrary to the views of the Board, your Committee think it desirable that a petition should be at once presented, asking that no alterations may be made. They recommend that the Chairman be authorized to seal a petition to that effect, and that the Solicitor be authorized, if he should find it necessary, to instruct counsel to appear in support of the petition. Your Committee wish, if possible, to avoid the expense of instructing counsel, and they have directed a letter to be written to the Board of Trade asking that department to give an assurance that the Bill, if opposed, shall not be allowed to proceed."

[The petition above referred to has since been withdrawn.]

A joint report by the Board's Engineer and Consulting Chemist as to the recent explosion of gas in the neighbourhood of Tottenham Court Road—the full text of which will be found in another column—was also presented, and a copy of it was ordered to be sent to each of the Gas Companies in the Metropolis.

THE CHESTER UNITED GAS COMPANY'S ACCOUNTS.

From a report presented to the Chester Town Council by Mr. J. E. Edwards, the City Treasurer, who was appointed to examine the accounts of the local Gas Company, it appears that the receipts of the Company increased during the period from 1869 to 1878 from £16,301 19s. 5d. to £21,416 2s. 1d., and the expenditure from £9965 4s. 4d. to £14,104 3s. 5d.; the net increase of profits being £975 3s. 7d. During the years 1875 to 1878 the Company had been paying the maximum amount of dividend allowed by their Act of Parliament, in addition to laying aside £3491 12s. 10d. for a reserve-fund, for the purpose of equalizing dividends. This fund now stands at £4467 0s. 10d. The charge made to the public for gas was as follows:—

1871–72	4s. 0d. per 1000 feet.
1873–75	4 6 „
1876	4 3 „
1877	4 0 „
1878	3 9 „

The capital expended to the date of the Company obtaining their last Act of Parliament was £77,791 0 7

Since that date it has been as follows:—

1870	£5,340 16 3	
1871	2,194 4 0	
1872	158 15 2	
1873	942 12 5	
1874	266 15 6	
1875	138 12 2	
1876	189 0 5	
1877	1,580 10 9	
1878	872 3 11	
		11,683 10 7

Total capital expended to Dec. 31, 1878 . . . . £89,474 11 2

The particulars of this additional expenditure are as follows:—

Cost of Act of Parliament	£493 7 10
Lands acquired	3,540 15 4
New buildings	203 15 10
New mains	7,445 11 7
	£11,683 10 7

The capital authorized to be raised by the Company's last Act of Parliament was £20,000, with power of mortgage for £5000, and of this there has been raised £16,500, leaving £8500 to be raised. The analysis of the capital so raised by the Company stands as follows:—

Consolidated ordinary stock on which 10 per cent. per annum may be paid	£30,000
Consolidated 7 per cent. preference stock	30,000
Ordinary new shares, 7 per cent.	14,000
Mortgages and bonds	17,500
Total	£91,500

The difference in the expenditure arose chiefly from two causes—from increased cost of labour and from the repairs to mains.

In concluding his report, the City Treasurer says: "I cannot but express an opinion that any present positive advantage which can be got from the Company in passing their proposed new Act will be found much more beneficial to the Town Council and the public generally than any supposed future gain to be derived from the careful watching of the manipulation in the charges between revenue and capital. The fact that the Company has been able of late years not only to pay the maximum dividends, but to accumulate a good reserve-fund, and this upon an unusually large capital, whilst it may show good management, is nevertheless a strong reason for seeking to obtain from the Company one or all of the following concessions:—1. A renewal of the power of the Council to purchase the works. 2. A reduction in the maximum charge which may be made for gas. 3. A reduction in the cost of lighting the public lamps. 4. A greater illuminating power in the gas."

THE HEREFORD CORPORATION NEW GAS-WORKS.

These works, the necessity and the site for which, it may be remembered, in 1878 caused much discussion and division in the Hereford Town Council, are, we learn, now nearly completed; and an official visit was recently paid to them by the Mayor, the Gas Management Committee, and others specially interested in the gas supply of the city, for the purpose of inspecting one of the finished gasholders and tanks, and the house for the Manager (Mr. W. Davis), which is almost ready for occupation.

The party first visited some cottages adjoining the works where certain additions are being made, after which they proceeded to the retort-house. The condensers were then examined, and subsequently an ascent was made to the tops of the scrubbers. After a look in at the boiler-house, where the excellent machinery came in for its share of admiration, the gasholder-tanks were visited. One tank, as stated above, is already fitted with its holder, but the other tank is at present unoccupied, although the excavation for it is completed, as well as the masonry which lines the interior. The purifier-house, to which is attached a large revivifying-shed for the oxide, was then looked over. This purifier-house was originally the foundry of the old Waggon Works, and the roof has been raised to provide the necessary room. The purifiers, with the travelling cranes above them for lifting the lids, and a revolving shoot for filling the boxes, were examined, as was also the whole of the apparatus, and a move was then made to the station-meter and governor house. The last place visited was the Manager's new house, which is situated on the right-hand side of the main entrance to the works. This building is substantial, commodious, and, at the same time, pleasing to the eye. Like the rest of the buildings, it is composed of red brick, relieved by two strings of ornamental bricks, and several courses of blue bricks. The interior comprises drawing-room, business-room, kitchen, scullery, pantry, washhouse, &c., all on the ground floor; and on the first floor there are two large bed-rooms, three smaller rooms, bath-room, &c.

Having inspected the house, the party were invited by the Mayor to luncheon, he occupying the chair, and Mr. Davis, by his request, the vice-chair. Luncheon over, a few congratulatory speeches were made.

Mr. RALPH, in response to the toast of "Success to the Hereford New Gas Works," said he thought the Gas Management Committee had every reason to be satisfied with the progress made in the works, and with the very able way in which these works had been carried out by their Engineer, Mr. Davis. He trusted that in the course of a couple of months from this time they would be in a position to make gas at the new works. Mr. Davis had every hope of doing so, and he (Mr. Ralph) thought if they could only prevail on the inhabitants of Hereford to burn sufficient gas, there could be no doubt whatever that the undertaking would be very successful. He asked the Manager the day before how long it was since they purchased the old works, and he was told it was eight years, and that seven instalments of the purchase-money out of the thirty had been repaid. He believed the total amount borrowed was about £60,000, and it was to be repaid in thirty equal instalments of interest and capital; so that, saying they were paying at the rate of £2000 a year principal, the city had already paid off £14,000, and he thought that the Auditor on going through the accounts said the Gas Management Committee had been able during the period of eight years to pay the whole of the interest and instalments due, and get a surplus of £6000, so according to that the city had benefited to the extent of £20,000, and really in a few more years would have benefited sufficiently to have paid the whole cost of the new works. He could only say it was a great pity the city had not

purchased the gas-works very much earlier. Perhaps the Mayor did not quite agree with him in this, and there might be some who would have been gratified if the purchase of the works had been deferred till now.

The Mayor: I think you purchased them just at the right time.

Mr. Ralph, continuing, said he hoped the new works would go on and be as successful in the future as the old ones had been in the past. He did not think any inhabitants of Hereford would have any reason to be other than glad that the Corporation had become the proprietors of the gas undertaking. He concluded by proposing "The Health of the Mayor."

The Mayor responded, and in his turn proposed "The Health of Mr. Davis," who, he said, had so ably carried on the old works, and also so admirably conducted the new ones, thereby keeping the inhabitants of the city from experiencing what they were somewhat afraid of at one time—viz., total darkness. He had no doubt the new works, when completed, would relieve Mr. Davis's mind of a great deal of anxiety, and he trusted that their Manager would be spared for many years to conduct the works which he had so far carried on satisfactorily towards completion.

Mr. Davis, in returning thanks, said that on the previous occasion of their meeting at the works he stated that it was his ambition to erect for the city new works within the estimate that had been prepared, and capable of supplying quite up to the quantity of gas proposed. Although they had gone a little over the expenditure that was originally intended, having provided a second gasholder-tank and some additional scrubbing power and other things, they had not really exceeded the first estimate, if deductions were made for the extras which were, as a fact, not included in it. The second tank was completed, and the first tank had the holder placed in it, and was now nearly filled with water. He had every confidence that it would prove satisfactory both in the working and as to being water-tight. He saw a letter in one of the papers the previous week relative to the explosions which had taken place in London and at Bilston, in which the writer wished for some statement from himself as to the condition of the new mains which had been laid down in Hereford. It was rather singular that on the Tuesday previous to the recent explosion in London he reported that he had completed the laying down of the new mains, and that they were being charged with gas. The question was asked when he should make the connection, and this led to an explanation of the danger of making connections in new mains until such time as the air was entirely cleared from the pipes, and they were fully charged with gas so that there should be no explosive compound in them. He then explained the precautions he had taken. In the first place, after making everything secure, the pipes were tested by means of a small pair of bellows and a pressure-gauge, and under this test they remained perfectly tight, from night till morning, under a half-inch head of water, the gauge being quite stationary. The next thing was to get the air out and the gas in. The highest point of the city was in Broad Street, and he there made a temporary connection with the old pipes, thereby supplying gas from the old pipes to the new at the highest point, and taking the air out at the lowest point for all practical purposes—at the back of the station near the works. After letting it blow out there through a pipe, which was sufficiently high to prevent any one from interfering or tampering with it, or applying a light to it, he tested it from time to time until he procured a mixture which was not explosive. He added that the same precautions would have to be taken in charging the mains from the new works, but he had no doubt it would be successfully done. He concluded by again thanking them for the compliment they had paid him in drinking his health.

The party shortly after this broke up.

ARBROATH GAS CORPORATION.

At the Meeting of the Arbroath Gas Corporation on Monday, the 12th ult.—Provost Reid in the chair—a balance-sheet of the undertaking (referred to farther on) for the year ended May 30 was laid on the table. It showed a surplus profit on the year's working of £761 8s. 8d., as against £740 7s. 6d. the previous year. The Gas Committee recommended that the price of gas for the current year be at the rate of 5s. 2½d. per 1000 feet, the same as last year, with a rebate of 2½d., making the rate equal to 5s. per 1000 feet. The Committee also recommended that one-half of the surplus profits should be paid as usual to the Town Council, for public improvements.

The Provost said he considered the balance-sheet was very satisfactory, and it would be for the Board to say whether the price of gas as recommended by the Committee should be approved of.

Bailie Thornton thought the Board had reason to be well satisfied with the balance on the accounts; but, so far as he could learn, the price of gas in Arbroath was a great deal higher than it was in surrounding towns, and he did not know but that they might be able this year to reduce the price of gas to 5s. per 1000 feet, with a rebate of 2½d.

Mr. Thomson moved the approval of the Committee's report. They had, he said, been many times at the works, and were perfectly satisfied that the old price would require to be adhered to. They had no idea what might occur at the works; they must be prepared for any accident, or an increase in the price of coal.

Bailie Keith seconded the motion.

Mr. Brown said since the Gas Act was passed in 1871, there had been paid to the town for public improvements £2728, which was an indirect tax; while £2066 had been paid by direct taxation for that purpose—together, £4794. He then quoted the prices charged for gas in neighbouring towns, for the purpose of showing that the charge in Arbroath was too high.

Bailie Thornton moved that it be fixed at 5s. He said he did not see anything to hinder them reducing the price of gas this year. He did not say there would be so much profit to go to the town as in former years if they reduced the price, but he did not consider it was the best way of taxation to charge the gas consumers for public improvements. He thought they should keep as near the margin as possible.

Mr. Cargill seconded Bailie Thornton's motion. On principle he thought that gas-making should as much as possible clear itself, and he did not think it was fair to tax the community for public improvements through their gas-meters. There were shopkeepers who were most unduly taxed in that way. He thought from what their Manager (Mr. Terrace) had stated as the estimate for the incoming year, that they would be perfectly safe in fixing the price of gas at 5s. per 1000 feet.

Mr. Herald, however, thought the Board should agree to the recommendation of the Committee.

Mr. Shield said he had seen no reason to change from the view he had held in committee, which was in favour of their recommendation.

Mr. Dickson thought the safe course was to adopt the Committee's report. He did not think it was fair to go too near the margin. They would soon have to double the amount now put into the sinking-fund, and it was desirable to keep as clear as possible.

On a vote being taken, the report was adopted by ten votes to four.

From the annual report of the Manager (Mr. David Terrace) we learn that the quantity of coals used during the year ending May 30 was 3559 tons, as against 3308 tons in 1878-79, being an increase of 251 tons, or 7½ per cent. The make of gas was 37,697,000 cubic feet, which was 2½ millions more than the previous year, or an increase of 7½ per cent.; but when compared with the year 1877-78, the increase was 4½ per cent. The make of gas per ton of coal carbonized was 10,591 feet, while the gas sold per ton was 9345 feet, or about the same quantity as in the previous year. The unaccounted-for gas for the year 1878-79 was 12·13 per cent. of the quantity made; last year it was 11·76, which is equal to a reduction of 0·37 per cent., or 34 feet more sold per ton of coal used. The number of consumers for the year ending May, 1879, was 5203; for the past year the number was 5227, or an increase of 24.

The balance-sheet shows that there was received from sales of gas in the past twelve months, £8563 16s. 4d.; and for rental of meters, £277 17s. 4d., loss a discount of 2½d. per 1000 feet of gas sold, £346 0s. 7d.; leaving a net result of £8495 13s. 1d. The sum of £459 11s. 6d. was received for tar and cinders; and this, with the balance brought forward from the previous year and miscellaneous receipts, brought up the credit of the profit and loss account to £10,058 16s. 8d. This sum was absorbed by the outgoings to within £761 8s. 8d., as stated in the Gas Committee's report above referred to.

METROPOLIS WATER SUPPLY.

The following are the returns of the Society of Medical Officers of Health on the Composition and Quality of the Metropolitan Waters in July:—

Names of Water Companies.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen — As Nitrates, &c.	Ammonia. — Saline.	Ammonia. — Organic.	Hardness (Clark's Scale). — Before Boiling.	Hardness (Clark's Scale). — After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	18·97	0·020	0·131	0·002	0·006	14·3	2·7
West Middlesex	19·62	0·020	0·125	0·002	0·009	14·3	2·7
Southwark and Vauxhall	17·87	0·004	0·125	0·001	0·005	14·3	2·6
Chelsea	18·18	0·004	0·131	0·001	0·004	14·3	2·7
Lambeth	18·51	0·064	0·120	0·000	0·009	14·0	2·6
Other Companies.							
Kent	32·93	0·000	0·424	0·060	0·004	22·4	4·8
New River	19·22	0·004	0·137	0·000	0·005	15·0	2·8
East London	21·45	0·048	0·131	0·000	0·009	15·4	3·0

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours.

The water was found to be clear and nearly colourless in all cases but the following, when it was slightly turbid—namely, Grand Junction.

C. Meymott Tidy, M.B., &c.

Metropolitan Board of Works.—At last Friday's meeting of the Board the following resolution—which, however, was not even seconded, and so fell to the ground—was proposed by Mr. John Jones: "That the gratuitous supply of water to each parish in the Metropolis (formerly provided by the parish pump, at the cost of the local rates) being suppressed by law, it is reasonable that a similar gratuitous, but purer supply of water be provided for the Metropolis at the cost of a general rate."

EXETER CORPORATION WATER SUPPLY.

A Special Meeting of the Exeter Town Council was held on Thursday last—the Mayor (Alderman Ellis) in the chair—for the purpose of receiving a report from the Finance Committee, and the Treasurer's estimate of the amount required to be raised by the general district-rate for the ensuing year. The report was somewhat lengthy, and was divided into sections, the second of which, having reference to the Corporation's water undertaking, showed that the sum of £120,000 had been raised on behalf of the Exeter Corporation Water Loan, and bonds issued for that amount; but the whole of the shares and debentures of the late Water Company, it was stated, had not yet been redeemed and paid off, although this loan was so intended. Remaining unpaid was the redemption value of shares in the Company, amounting to £8225, and debentures of the value of £11,450. This sum of £19,675 had been temporarily employed in the purchase of property for street and other improvements, and would be repaid by future loans. With regard to the ordinary income and expenditure, the Treasurer reported an excess of the latter, caused partly by the payment of £9152 11s. 3d. additional interest on loans (including the water undertaking loan); whereas the sum of £2335 1s. 8d. only had been received from the Water Committee, out of a sum of £4671 16s. 2d., which they should have provided.

The Water Committee's report showed total receipts for 1879 and 1880 of £18,655 2s. 6d.; and payments for 1879, £10,072 12s. 2d.; and 1880, £8212 16s. 11d.; making a total of £18,285 9s. 1d., and leaving a balance in hand of £369 13s. 5d. There was, however, still due to the district-fund account the sum of £2336 14s. 6d. in respect of interest, and also the sum of £8407 10s., the amount necessary to be set aside the first year towards the sinking-fund; making altogether due from the Water Committee, £2744 4s. 6d. The Water Committee claim the past two years as exceptional, according to the following figures:—Ironwork, repairs of engines and of water-wheels, £1169 4s. 8d.; cost of the Company on purchase, £296 16s. 8d.; filter-beds (first portion), £600; sum paid the Company for stock and moveable plant, £997 18s. 6d.; accumulated stock of the value of £1369 16s. 3d.; making a total of £4433 19s. 1d.

The Corporation water accounts were also given, and show that for the year ending March 25, 1879, the payments were £10,072 12s. 2d., leaving a deficit of £583 16s. 11d. upon the receipts of the year to be carried forward. The general balance-sheet for the same year showed the assets to be £2180 0s. 2d.; while the liability account was as follows:—To balance of revenue account, £583 16s. 11d.; acknowledgments owing, £1 5s.; interest on bonds and annuities, £1003 15s. 5d.; balance, £591 2s. 10d.—total, £2180 0s. 2d. The revenue account for the year ending March 25, 1880, showed receipts, £9166 7s. 3d.; while the payments were less this amount by £369 13s. 5d. The general balance-sheet gave the total assets at £3828; and the liabilities—viz., salaries and working expenses—at £699 1s. 11d.; interest due to Urban Sanitary Authority, £2336 14s. 6d.; three months interest on debentures, £116 9s. 1d.; six months annuities, £171 7s. 1d.; balance, £504 14s. 7d.—total, £3828 7s. 2d.

The report having been previously placed in the hands of the members, was taken as read; and, after discussion, adopted.

The Proposed Acquisition of the Strood Water-Works by the Rochester Corporation.—An extraordinary meeting of the Strood Water-Works Company was held on Wednesday, the 21st ult.—Mr. Ball in the chair—when it was unanimously decided to consent to the Bill introduced into Parliament to enable, among other measures, the Rochester Corporation to acquire the Strood Water-Works. At the same meeting Mr. H. Wickham, Solicitor to the Company, was appointed Secretary, in the place of Mr. G. Ruck, deceased.

THE RECENT GAS EXPLOSION NEAR TOTTENHAM COURT ROAD.

The following report on the recent gas explosion near Tottenham Court Road, by the Engineer (Sir J. W. Bazalgette) and the Consulting Chemist (Mr. T. W. Keates) of the Metropolitan Board of Works, was presented at the meeting of the Board on Friday last, and a copy ordered to be forwarded to each of the London Gas Companies:—

Spring Gardens, S.W., July 23, 1880.

To the Works and General Purposes Committee.

In compliance with the order of the Board, we beg leave to submit the following report upon the circumstances attendant upon the gas explosion which occurred in a large gas-main belonging to The Gaslight and Coke Company, on the 5th inst.

It is probable that the members of the Committee have made themselves generally acquainted with the circumstances of this occurrence; but it is necessary, in order to make our report clear, that we should trouble the Committee with some details, which are perhaps already known to them, but which cannot conveniently be omitted.

The main in which the explosion took place extended from the corner of Bayley Street, Tottenham Court Road, along Percy Street, and up Charlotte Street, where it was united to an equally large main running along Howland Street, but being cut off from the Howland Street main by a valve which appears to have never been opened up to the time of the explosion. These mains were of large size—3 feet in diameter.

The portion of the main along which the explosion occurred commenced with a plugged (or closed) end in Bayley Street, opposite the Bedford Head Hotel; it then crossed the Tottenham Court Road, ran along Percy Street, and thence north along Charlotte Street, to the valve in Howland Street.

This was a new main which was intended to be continued eastward. It appears to have been completed and kept closed, or dead, for about two months, the connection with the eastern section in Bayley Street not having been made. Preliminary to the making of this connection, the main appears to have been tested in the usual way, a ½-inch stand-pipe having been let into the top of the main, so that a pressure-gauge might be attached to it.

It was intended that the connection should be made on Tuesday, July 6. With this view, between six and seven o'clock on the evening of Monday, the 5th, the plug or iron flange which stopped the Bayley Street end of the main was being cut out. The foreman was standing on the main at the time, and had removed the pressure-gauge from the end of the ½-inch stand-pipe. It is very important to remark that the gauge, before it was removed, had stood at zero, showing that there was no pressure in the closed main. The foreman had roughly tested the air in the main by smelling at the open end of the small stand-pipe, and, "as an additional precaution," he put a lighted match to the orifice, which act was followed immediately by an explosion. Six other explosions followed upon this, in the course of the new main, but in one respect this was the most serious, inasmuch as it was by the effect of the first explosion that two workmen were killed.

The ground was open at this point, as it was here that the connection was to have been made between the two sections of new main. The two men who were killed were at work in the trench between the plugged end of the completed main and the open end of the unfinished portion. By the force of the explosion the iron plug was blown out with great violence, killing one man on the spot, and fatally injuring the other.

The explosion at the corner of Bayley Street was the first of the seven which ultimately occurred between this point and the valve at Howland Street.

Taking the distances of the exploded portions of the main in order from Bayley Street, the second explosion took place in Percy Street, about 215 feet from the first. At this point about 110 feet of the main, and the paved carriage-way, for a width of from 10 to 12 feet, was blown up, and the footway, area walls, and various parts of the houses, Nos. 14 to 19, Percy Street, were damaged.

The third explosion was about 465 feet from the first, and was opposite No. 6, Percy Street; 12 feet of the main and 20 feet by 15 feet of the carriage-way were blown up at this spot; the footway and the houses Nos. 5 and 6 were damaged; some damage also was done to Nos. 7, 8, and 9, on the same side of the street, and to Nos. 32 to 35, on the opposite side of the street.

The fourth explosion was 645 feet from the first, and was opposite Nos. 3 and 5, Charlotte Street. At this place 11 or 12 feet of the main were blown up, and the road, footway, vaults, and areas were destroyed within a space of 28 feet by 24 feet, besides other damage which was done to the houses.

The fifth explosion was 955 feet from the corner of Bayley Street, and was opposite to Nos. 29 and 31, Charlotte Street at the corner of Bennett Street. An opening was made in the street at this place, the opening being 55 feet long, 10 feet wide in one part, and 23 feet wide for the remainder of the distance; the vaults being destroyed, and a good deal of other damage done to the property.

The sixth explosion was 1835 feet from the point where the first occurred; this was opposite Nos. 103 and 105, Charlotte Street. Here 12 feet of main were blown up, and an opening 28 feet by 31 feet was made in the carriage-way; the two houses were also damaged. The local sewer also appears to have been seriously injured.

The last or seventh explosion took place at the right-angled junction of the two 3-feet mains at the point where Howland Street crosses Charlotte Street and Fitzroy Street, or about 2075 feet from the corner of Bayley Street, where the first explosion took place. The valve which at this junction cut off the charged main in Howland Street from the closed, or dead, main in Charlotte Street, and also the T-piece junction, were shattered to pieces, and an opening 12 feet by 10 feet made in the carriage-way; but there appears to have been no further damage in this locality.

The circumstances which seem most worthy of note in connection with this explosion are—first, as to the means by which the gas found its way into the new main from which it was supposed to be cut off by a sound and efficient valve; secondly, as to the way in which seven successive explosions occurred with an interval of time between them respectively.

With regard to the first point, two theories were raised to account for the presence of sufficient gas in the new main to produce the explosive mixture of air and gas. One of these supposed the gas to have entered the main by leakage from without; the other that the gas entered at the Howland Street end of the new main in consequence of a defect in the valve, which was situated at that point.

There seems very little probability that the gas could have entered the new main by leakage from without, and no reason seems to have been given to support that view. In our opinion there can be very little doubt that the gas found its way into the new main through the valve at Howland Street, which might by some means have been slightly injured. In that case a leakage of no great amount would be sufficient to admit enough gas to account for the mischief. The cubical contents of the whole main involved in the explosion were between 14,000 and 15,000 feet, and as it is obvious, from the circumstance that explosions occurred only in certain points in the course of the main, that the whole of the contents were not explosive, probably less than 2000 cubic feet of gas were in the main in more or less complete admixture with the air, and it would not require a great leak in the valve for 2000 feet of gas to pass in the course of the time during which the new main had remained unused after its completion.

The Coroner's jury took the view that the gas had entered the new main in consequence of some defect in the valve at the Howland Street junction, and this appears to us to be the correct view. Unfortunately, the valve and its fittings were entirely destroyed by the last explosion, so that there were no means of making any investigation concerning the previous state of the valve; but all the circumstances of the case seem to point to the valve as the origin of the mischief, whereas there seems to be nothing to support the theory that gas found its way into the new main by leakage inwards, such gas having previously leaked out of other mains in the vicinity of the new main.

If it be admitted, as is most probable, that the gas passed by the valve from the fully charged main in Howland Street, into the new main in Charlotte Street, the formation of an explosive or inflammable mixture of gas and air was a necessary concomitant; whether such mixture would be explosive or merely inflammable was only a question of proportion between the gas and air, and the completeness of the admixture or diffusion of the gas. If the gas were in less proportion than about 7 per cent. by volume, or more than 25 per cent., it would burn away quietly, and not explode; but if it were in the proportion of something between 7 and 25 per cent., the mixture would be more or less violently explosive. It seems certain that a mixture of gas and air, explosive in some places but only inflammable in the great part of its course, had been formed in the new gas-main, and further it seems only reasonable to believe that the gas had entered by the valve, and not by leakage inwards, into the main, which had been proved to be thoroughly sound under considerable pressure of air, which had been kept on from Thursday, the 1st, until Sunday, the 4th of July.

With respect to the second point for consideration, it is very interesting to observe that a number of distinct explosions took place in regular order, and with a clear interval of time between them. It seems, at the first view of the matter, remarkable that this should have been the case, as it might have been expected that the gas would have diffused itself into the air contained in the main during the considerable time that had elapsed after the main was finished up to the plugged end, and that an uniform mixture would have been formed, either simply inflammable or explosive in its nature. If the mixture were explosive, then it might have been expected that one general explosion of the whole of the contents of the main would have taken place at one moment, the iron pipe probably giving way in any spot in which it was weakest, or in which the pressure of the earth above and about it happened to be least. This, however, was not the case. When the light was applied to the top of the stand-pipe in the end of the main at Bayley Street, an immediate explosion followed, the effect of which extended only to that particular spot; after an appreciable time had elapsed, a second explosion occurred in the course of the pipe; then another, and so on, up to seven; the distances between the points of explosion varying from 180 to 880 feet. With the exception of the fourth explosion, at the corner of Charlotte Street and Percy Street, the points of disruption were in the straight run of pipe, and the effect was exactly as if a mine of gunpowder had been laid at each point where the explosion occurred; if such mines had been connected by a match, they would have exploded in succession, as the match burned away, exactly as the gaseous mixture exploded in the main.

It is not easy to understand why the mixture of gas and air should have been formed in such different proportions in the different parts of the pipe that in some places the mixture should be explosive, in other places only inflammable. It has been suggested that the mixture was uniformly explosive throughout the whole length of the main, but that the disruption or bursting of the main only occurred in certain comparatively weak places. This view does not, however, bear examination. If the mixture of gas and air had been uniformly explosive, it can only be believed that the explosion would have been momentary from one end of the pipe to the other, and that the bursting of the pipe at the seven different points would have been almost or quite simultaneous. This, however, was not the case. Testimony shows that the seven explosions followed each other with a distinct interval of time between them, just as would be the case if an explosive mixture of gas and air had existed at the seven points of disruption, and a simply inflammable mixture along the pipe between those points, such inflammable mixture only serving as a means of carrying the fire from one collection of explosive mixture to the other, and the time which elapsed between each explosion being consumed in the progress of the flame along the pipe. Flame does not travel with very great rapidity under such circumstances, and the interval between the explosions would be thus fully accounted for.

It seems impossible to doubt that, from some cause or another, mixtures of air and gas in different proportions did really exist in the main at the time of the catastrophe; that at certain points, where indeed disruption took place, collections of an explosive mixture had formed, while between those points the mixture was only inflammable. It is difficult to explain why this should have happened, but it seems impossible to account for the occurrence of the seven successive explosions upon any other hypothesis. It might have been that irregular diffusion of the gas was favoured by some irregularity in the vertical position of the main; but any attempt to account satisfactorily for the conditions which led to the remarkable circumstances of the occurrence must, with our limited knowledge of the facts, be merely speculative.

After all, the most important question now is as to the practical lesson to be learned from this accident. It is obvious that considerable danger may exist in connection with the practice of testing gas-mains before they are brought finally into use, and that when the mains are of the large size now generally laid down, and where the cubical contents are consequently great, the danger may be very considerable, as has been shown in the case now under consideration.

In the first place, the application of a light to test the unknown contents of a main which is in connection with another main charged with gas, is an act which seems to us to border on temerity. It is quite impossible to know that leakage from a charged main into a new main may not take place at any time. Under such circumstances, the formation of an explosive mixture is only a question of degree; and to suppose that fire will not travel down a pipe, even of small diameter, is a very dangerous error.

In the second place, the danger of applying a light may be entirely avoided. The Davy lamp affords an illustration that flame may be applied to test a gaseous mixture, provided that proper arrangements be made to prevent the direct contact of the flame with the inflammable or explosive mass. If on the top of the stand-pipe screwed into the main at the blank end in Bayley Street there had been applied a contrivance analogous in principle to that of the Davy lamp, or like what was known as Maugharm's jet in connection with the oxy-hydrogen blowpipe, no danger in applying a light would have existed, and no accident would have occurred. It is desirable that the attention of gas companies should be directed to this

point. To apply a naked light to the top of a stand-pipe connected with a main in the manner in question, was a most dangerous act, and such a thing ought never to be repeated without precautions quite easy of application, and which would be effective in obviating danger.

(Signed) J. W. Bazalgette, Engineer.
T. W. Keates, Consulting Chemist, &c.

Of the seven persons who were so severely injured on the occasion of the explosion as to necessitate their becoming in-patients at the Middlesex Hospital, only two at present remain there under treatment. These are Emma Bryant, the servant at No. 3, Charlotte Street, whose recovery was for some time extremely doubtful, and George Trite, the nephew of the landlady of that house, who was very seriously injured. One man, who received a severe scalp wound, has become an out-patient of the Hospital, and another, who was similarly injured, has been discharged. No other deaths beyond the two recorded at the time of the accident, have therefore taken place. An appeal on behalf of the sufferers was publicly made shortly after the occurrence, by the Chaplain of the Hospital, and it has been well responded to, the total amount already received being £81 3s. He now announces that, in consequence of the liberal arrangements that are being made for the sufferers, further contributions will not be needed. In the meantime, the work of restoring the broken main, and shoring up and reinstating the house property and roadway damaged by the explosion, is being prosecuted with great diligence. The trench at the corner of Bayley Street has been filled in, and the thoroughfare repaved; while in Percy Street, where probably the greatest damage was done, the pavement on the south side has been again opened for pedestrians, and business resumed. There still remains much to be done in the way of rebuilding and making good the basements of the damaged houses; but the work is steadily progressing, and it is probable that in a very short time comparatively few signs will exist of the havoc caused by this remarkable catastrophe.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The most important item of news in connection with gas affairs this week is the probable reduction of the price of gas in Glasgow to the extent of 2d. per 1000 cubic feet. A meeting of the Gas Committee of the Town Council was held last Thursday for the purpose of considering the Corporation gas accounts for the past financial year, which were found to be in a most gratifying state. It is understood that the Committee have secured such favourable coal contracts for the ensuing twelve months as to justify them in resolving to recommend the Town Council, at the next meeting of that body, to reduce the price of gas from 3s. 10d. to 3s. 8d. per 1000 feet, the reduction to be retrospective and to take effect from the last meter survey, which was made in the month of May. If the recommendation is approved of, the remission to the gas consumers of the city and suburbs will probably amount to something like £16,600, as compared with their payments for the past year's consumption. In considering the question of the cheapness of gas in Scotland, it is proper to remember that the Glasgow Corporation Gas Commissioners do not make any extra charge in the shape of meter-rent. Were such a charge levied upon the consumers, say to the extent of 2s. per annum (which is not the highest meter-rent in Scotland), there would be an additional item of annual income amounting to upwards of £13,000.

It has just been resolved by the Directors of the Linlithgow Gas Company to reduce the price of gas 5d. per 1000 cubic feet—from 5s. to 4s. 7d.—and it is understood that they have also resolved to supply a better quality of gas during the ensuing year.

The Mid and East Calder Gaslight Company have declared a dividend of 4 per cent. upon the profits of the past year's transactions. The price of gas is to remain the same as during the past twelvemonth—viz., 8s. 4d. per 1000 feet.

Edinburgh Gas Company's stock was inquired for last Thursday at £45 10s. per share, being an advance of 5s. per share.

After an enormous amount of talk and procrastination, the Falkirk Town Council have, at last, made a practical commencement of the scheme for supplying that town with water on a scale somewhat commensurate with the necessities of the community. Some time ago one of the members of the Council, by a fortuitous circumstance, devised an impromptu supply, which has in reality saved the town from a water famine, and but for which the state of matters in the town would long ere this time have been desperate. At the last meeting of the Council it was resolved to instruct Mr. W. Black, C.E., the Burgh Engineer, to proceed with the preparation of plans and specifications for carrying out a scheme of water supply in concert with the Callendar Coal Company.

The people of Stirling and its suburbs are still on "short commons" as regards their water supply, which was lately reported to be sufficient only for a fortnight. It is seriously contemplated by the Water Commissioners to form a new reservoir.

It was recently resolved by the Hawick Town Council to proceed with the Dodburn water supply scheme, by which it is expected to augment the supply to the extent of 600,000 gallons per day, at an estimated cost of £12,592. Messrs. J. and A. Leslie, of Edinburgh, have been entrusted with the engineering part of the work, and the pipe contract has already been settled—£6430 for about 1500 tons of pipes.

The Wormit water supply has now been made available to the inhabitants of Newport by arrangement with the Water Commissioners of Dundee, pending the reconstruction of the Tay Bridge.

Rapid progress is being made with the construction of the new reservoirs in connection with the water-works for Paisley and Ayr—indeed, the one at Carchire, for the last-named town, is nearly completed.

At the last meeting of the Edinburgh and District Water Trust the annual accounts to May 15, 1880, were submitted and approved of. The estimate of expenditure was £65,172 13s. 3d., and the actual payments during the year amounted to £64,591 18s. 9½d. There had, therefore, been expended £580 less than the estimate. Then the original estimate of revenue was £63,273 12s. 8d., whereas there had actually been received £63,532 2s. 11½d., or nearly £260 more than was anticipated. This shows a very satisfactory state of matters.

During the three months ending the 30th of June the average consumption of water in Aberdeen was 4,378,780 gallons per day.

The new water-works for the town of Galashiels, which have been in progress for three or four years, may now be said to be completed. Two of the main features of the scheme (the general plan of which was excellent) were a large compensation reservoir on the Adder to keep up the minimum flow of water during the dry months of summer for the use of tenants and others on the course of the stream downwards to the River Tweed. This part of the work has been very successfully carried through, the new reservoir forming a fine sheet of water from 25 to 30 acres in extent, and 60 feet deep at the embankment. The other part of the scheme was a clear water basin, with storeage to supply the town for about 20 days. The clear basin was placed in Knowes Dean, a deep natural gorge in the side of the hill, and has proved unsatisfactory.

It has been resolved by the Wick Town Council to proceed with a water supply scheme devised by Messrs. M'Bey and Gordon, of Elgin, and which aims at bringing water from the Loch of Yarrows, the estimated cost of which, including reservoir, is set down at £5600.

The annual meeting of the Shareholders of the Kilmarnock Water Company was recently held, when a dividend of 7 per cent. on the ordinary stock was declared. Kilmarnock is the only town of any importance in Scotland where the water supply undertaking is in the hands of a private Company.

There was a strong pig iron warrant market during the past week, and a very extensive business was done from day to day. As high as 55s. 7½d. cash was paid on Monday forenoon, and up to 55s. 4½d. cash was also paid on Friday forenoon, although in the afternoon the highest price paid was 54s. 10½d. one month. It seems that there are great expectations of an excellent autumn trade being done. Makers have advanced their prices 1s. per ton.

A very desponding feeling is showing itself in the coal trade, and prices remain exceedingly low, main coal being shipped at Glasgow at 5s. 6d. per ton, and splint coal at 6s. per ton, f.o.b.

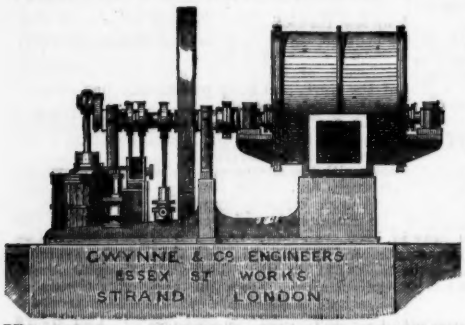
THE PROPOSED PURCHASE OF THE LINCOLN GAS-WORKS BY THE CORPORATION.—An extraordinary meeting of the Shareholders of the Lincoln Gaslight and Coke Company was held on Monday, the 26th ult. The principal business of the meeting was to consider the agreement made for the purchase of the Company's works by the Corporation. An opposition was raised on account of the large amount of money the Corporation would take over, without consideration, in addition to the profits; some of the Shareholders holding that they were entitled to ¼ per cent. more than their statutory dividends. The agreement was, however, eventually adopted.

Share List of Gas and Water Companies.

Number of Shares issued.	Amount per Share.	Name.	Amount paid up per Share.	Last Divd. p. Cent. p. Ann.	Latest Quotations.
	£	Gas Companies.	£ s. d	£ s. d	£
589944	10	Alliance and Dublin	10 0 0	10 0 0	17–17½
10000	20	Anglo-Romano . .	20 0 0	10 0 0	21–23
5000	20	Bahia (Limited). .	20 0 0	4 0 0	15–16
1000	20	Do., 1st pref. . .	20 0 0	10 0 0	25–27
1500	20	Do., 2nd pref. . .	20 0 0	7 10 0	20–22
40000	5	Bombay (Limited).	5 0 0	7 10 0	5⅞–6¼
10000	5	Do., fourth issue.	4 0 0	7 0 0	⅛–¼ pm.
10000	10	Bournemouth . . .	10 0 0	8 0 0	13¾–14½
229700	..	Brentford	100 0 0	9 0 0	..
..	..	Do., 5 per ct. pref.	100 0 0	5 0 0	95–100
..	20	Do., D shares . .	18 0 0	9 0 0	6–8 pm.
5400	20	Brighton	20 0 0	10 0 0	35–36
5000	20	Brighton and Hove	20 0 0	10 0 0	35–37
14000	20	British (Limited) .	20 0 0	10 0 0	35–37
7282	20	Cagliari (Limited).	20 0 0	8 0 0	17–18
1500	10	Colney Hatch . . .	10 0 0	5 0 0	9–11
5500000*l.*	Stk.	Commercial	100 0 0	11 5 0	190–194
700000*l.*	Stk.	Do., 7 per cent. .	100 0 0	8 5 0	135–140
20000	20	Continental Union.	20 0 0	6 10 0	20½–21½
20000	20	Do., new	14 0 0	6 10 0	11½–½ dis
10000	20	Do., preference .	20 0 0	7 0 0	24½–25½
75000*l.*	Stk.	Crystal Palace District	100 0 0	10 0 0	173–177
125000*l.*	Stk.	Do., 7 per cent. .	100 0 0	7 0 0	122–127
50000*l.*	Stk.	Do., preference .	100 0 0	6 0 0	118–122
25000	6	Do., ordin. 7 p. c.	1 4 0	7 0 0	¾–1 pm.
7100	25	Edinburgh	25 0 0	10 0 0	46–48
23406	10	European (Limited)	10 0 0	10 0 0	19–20xd
12000	10	Do., new shares.	7 10 0	10 10 0	6–7xd
35406	10	Do., new shares .	5 0 0	10 10 0	4½–5xd.
40963007	Stk.	Gaslight & Coke A.	100 0 0	10 10 0	187–189
1000007.	Stk.,	Do. B.	100 0 0	4 0 0	73–75
50000	10	Do. do., 5th do. .	10 0 0	5 0 0	17½–18
2000007.	Stk.	Do. C 10 p.c. pref.	100 0 0	10 0 0	213–217
3000007.	,,	Do. D do. do. .	100 0 0	10 0 0	213–217
1650007.	,,	Do. E do. do. .	100 0 0	10 0 0	213–217
300007.	,,	Do. F 5 do. do. .	100 0 0	5 0 0	101–104
600007.	,,	Do. G 7½ do. do. .	100 0 0	7 10 0	150–156
1300000*l.*	,,	Do. H	100 0 0	7 0 0	134–136
1500	32½	Shanghai	32 10 0	12 0 0	..
135000	100	Sheffield, A	100 0 0	10 0 0	197–198
99700	100	Do., C	100 0 0	10 0 0	195–197
12500	5	Singapore (Lim.) .	5 0 0	7 10 0	6–6½
2000	5	Do., preference .	5 0 0	7 10 0	5¾–6¼
6200	5	Georgetown, Guiana	5 0 0	7 0 0	4¼–4¾
300000	100	Glasgow Corporation Gas	100 0 0	9 0 0	205–210
115000	100	Do., do.	100 0 0	6 15 0	155–160
..	100	Grimsby Gas, A . .	100 0 0	..	186–190
..	10	Hampton Court . .	10 0 0	10 0 0	15–16
7800	10	Hong Kong (Lim.)	10 0 0	10 0 0	15–16
5000	10	Hornsey	10 0 0	10 0 0	15–16
2000000*l.*	100	Imperl. Continental	100 0 0	10p.c.& ½ p.c. bonus	187–189
..	..	Kingston	..	..	..
..	..	Lea Bridge	..	7 0 0	11½–12½
561007.	100	Liverpool United .	100 0 0	10 0 0	180–185
1691007.	100	Do., B	100 0 0	7 0 0	125–135
3865007.	Stk.	London	100 0 0	10 0 0	183–186
1500007.	Stk.	Do., 1st pref. . .	100 0 0	6 0 0	123–126
..	25	Do., A shares . .	25 0 0	6 0 0	130–132
266927.	Stk.	Do., Debenture stock	100 0 0	5*l.* & 6*l.*	..
15000	5	Malta and Mediterranean (Limited).	5 0 0	2 10 0	2½–2⅝
6000	5	Do., preference .	5 0 0	7 10 0	5–5½
20000	5	Mauritius (Limited)	2 5 0	1 0 0	1⅞–1¼ dis
25000	20	Monte Video (Lim.)	20 0 0	6 0 0	16–17
8000	10	Nictheroy, Brazil (Limited)	10 0 0	5 0 0	6–6½
30000	5	Oriental (Calcutta).	5 0 0	9 0 0	7–7½
30000	5	Do., new shares .	4 0 0	9 0 0	1¼–1⅝pm
10000	5	Ottoman (Limited).	5 0 0	8 0 0	2½–2⅝
10000	10	Pará (Limited) . .	10 0 0	5 0 0	5½–6½
3000	10	Richmond (Surrey)	10 0 0	10 0 0	17–17½
3000	10	Do., new	10 0 0	9 0 0	..
27000	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	27–29
135000	100	Shanghai	32 10 0	12 0 0	..
100000	100	Sheffield, A	100 0 0	10 0 0	197–198
99700	100	Do., C	100 0 0	10 0 0	195–197
12500	5	Singapore (Lim.) .	5 0 0	7 10 0	6–6½
2000	5	Do., preference .	5 0 0	7 10 0	5¾–6¼
500000*l.*	Stk.	Georgetown, Guiana	5 0 0	7 0 0	4¼–4¾
1305000	Stk.	Glasgow Corporation Gas	100 0 0	9 0 0	205–210
12000	5	Do., do.	100 0 0	6 15 0	155–160
2864	10	Grimsby Gas, A . .	100 0 0	..	186–190
1500	10	Hampton Court . .	10 0 0	10 0 0	15–16
1500	10	Hong Kong (Lim.)	10 0 0	10 0 0	15–16
4000	10	Hornsey	10 0 0	10 0 0	15–16
26000	5	Imperl. Continental	100 0 0	10p.c.& ½ p.c. bonus	187–189
..	10	Kingston	..	..	..
2400	5	Lea Bridge	..	7 0 0	11½–12½
		Liverpool United .	100 0 0	10 0 0	180–185
		Do., B	100 0 0	7 0 0	125–135
		London	100 0 0	10 0 0	183–186
		Do., 1st pref. . .	100 0 0	6 0 0	123–126
		Do., A shares . .	25 0 0	6 0 0	130–132
		Malta and Mediterranean (Limited).	5 0 0	2 10 0	2½–2⅝
		Do., preference .	5 0 0	7 10 0	5–5½
		Mauritius (Limited)	2 5 0	1 0 0	1⅞–1¼ dis
615000	100	Monte Video (Lim.)	20 0 0	6 0 0	16–17
1624700	100	Nictheroy, Brazil (Limited)	10 0 0	5 0 0	6–6½
10798	50	Oriental (Calcutta).	5 0 0	9 0 0	7–7½
5840	25	Do., new shares .	4 0 0	9 0 0	1¼–1⅝pm
6160	25	Do., new ditto; max. div., 7½ p.c.	25 0 0	5 0 0	52–55
		Ottoman (Limited).	5 0 0	8 0 0	2½–2⅝
5551807.	100	Pará (Limited) . .	10 0 0	5 0 0	5½–6½
7818007.	100	Richmond (Surrey)	10 0 0	10 0 0	17–17½
3261507.	100	Do., new	10 0 0	9 0 0	..
442	100	Rio de Janeiro (Limited)	20 0 0	10 0 0	27–29
4475	100	Do.	85 0 0	10 3 8	280–300
400000	100	Shanghai	32 10 0	12 0 0	..
6668007.	100	Sheffield, A	100 0 0	10 0 0	197–198
3247007.	100	Do., C	100 0 0	10 0 0	195–197
1265007.	100	Do., D shares. .	100 0 0	6 0 0	165–170
15073	61	West Middlesex .	61 0 0	6*l.* p.sh.	165–168
1300000*l.*	Stk.	South Metropoltn.	100 0 0	11 10 0	204–207
1305000	Stk.	Do., "B"	100 0 0	10 0 0	184–187
12000	5	Tottenham & Edmonton	5 0 0	10 0 0	9–9¼
2864	10	Do.	6 0 0	7 0 0	..
1500	10	Wandsw. & Putney	10 0 0	10 0 0	14½–15
1500	10	Do.	10 0 0	7 10 0	12½–13½
4000	10	Do.	10 0 0	7 0 0	11½–12
26000	5	West Ham	5 0 0	10 0 0	8½–9½
..	10	West Kent	10 0 0	10 0 0	14–16
2400	5	Woolwich, Plmstd. and Charlton . .	5 0 0	16 0 0	9–10
		Water Companies.			
1300000*l.*	Stk.	Chelsea	100 0 0	6 10 0	190–195
1624700	100	East London . . .	100 0 0	6 10 0	190–195
10798	50	Grand Junction .	50 0 0	5 0 0	103–106
5840	25	Do., ¼ shares . .	25 0 0	5 0 0	52–55
6160	25	Do., new ditto; max. div., 7½ p.c.	25 0 0	5 0 0	40–45
5551807.	100	Kent	100 0 0	8 0 0	270–280
7818007.	100	Lambeth	100 0 0	6 10 0	190–195
3261507.	100	Do., max., 7½ p.c.	100 0 0	6 10 0	170–175
442	100	New River	100 0 0	10 3 8	360–370
4475	100	Do.	85 0 0	10 3 8	280–300
6668007.	100	Southwrk & Vauxh.	100 0 0	6 0 0	190–195
3247007.	100	Do., pref. stock.	100 0 0	5 0 0	125–128
1265007.	100	Do., D shares. .	100 0 0	6 0 0	165–170
15073	61	West Middlesex .	61 0 0	6*l.* p.sh.	165–168

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, TWO MEDALS at the PHILADELPHIA EXHIBITION and TWO MEDALS at the PARIS EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

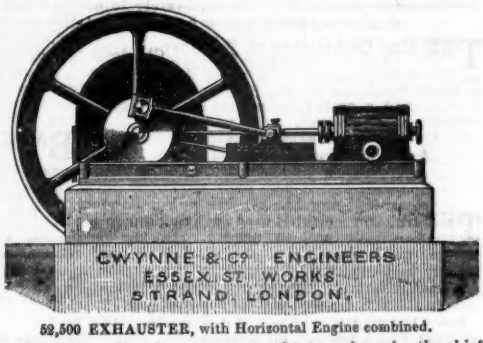
GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 8,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



52,500 EXHAUSTER, with Horizontal Engine combined.

GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas WITHOUT OSCILLATION OR VARIATION IN PRESSURE Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

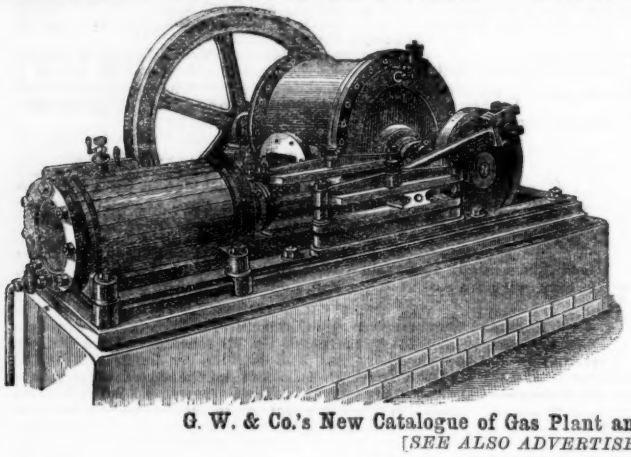
PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

Gwynne & Co.'s New Catalogue on Gas-Exhausting and other Machinery may be obtained on application at the above Address.

BEALE'S IMPROVED PATENT GAS EXHAUSTERS,

WITH

Wrought-Iron Spindles and ENGINES COMBINED.



SOLE MAKERS,

GEORGE WALLER & CO.

MAKERS OF ENGINES, EXHAUSTERS, INDEX AND DISC GAS-VALVES, HYDRAULIC MAIN VALVES, BYE-PASS VALVES, TAR, LIQUOR, AND OTHER PUMPS, SCRUBBERS AND PURIFIERS, CONDENSERS, BOILERS, &c.

G. W. & Co.'s New Catalogue of Gas Plant and Machinery can be had on application.

[*SEE ALSO ADVERTISEMENT, PAGE* 198.]

Phœnix Engineering Works:

HOLLAND STREET, SOUTHWARK, S.E.

WANTED, Readers of the NEW Edition, "Cooking & Heating by Gas;" on Burners, &c. Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Assoc.M.I.C.E., Gas-Works, SYDENHAM.

WANTED, a Situation, by a Young Man who has been used to Making and Repairing both Wet and Dry Gas-Meters. Eight years experience. Can give good character. Total abstainer. Address S. W., 26, Bolwell Street, Lambeth, LONDON, S.E.

WANTED,—The Advertiser, a Young Man, aged 39, married, is open for an Engagement as MANAGER and SECRETARY of a medium-sized Gas-Works, or SUB-MANAGER of a large Works. Has a thorough Knowledge of the Manufacture and Distribution of Gas in all its branches, having had sole management of Gas-Works for 16 years. Highest testimonials and references. Address No. 678, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Situation as Manager of a medium-sized Gas-Works or ASSISTANT MANAGER in a large Gas-Works. Advertiser has a thorough Practical Knowledge of the Manufacture and Distribution of Gas, and had for several years the entire Management of a Gas-Works abroad, which always gave good results. Has also a good Knowledge of Gas Engineering in all its branches, and was for many years a Draughtsman previous to going abroad. Satisfactory reasons for leaving last situation. First-class testimonials and references. Address No. 671, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Working Foreman in a small Gas-Works, competent to attend to minor Repairs, to Superintend larger Mechanical Operations, and the Meter Department. He will be required to fill up his time in Office work. Apply, stating terms required, to W. JARVIS, Manager, Gas-Works, KINGSBRIDGE.

THE Advertiser wishes strongly to recommend a good steady Man as WORKING MANAGER or CARBONIZING FOREMAN of a Gas-Works. Is well up in Setting Retorts, Mains, and Services, and Interior Fittings, and Repairs of Meters. Will be disengaged on the 27th of August. Satisfactory reasons for leaving present situation. Apply to C. FISHER, Esq., Church Gate, Loughborough, LEICESTERSHIRE.

WANTED, a Manager in a Merchant's Office, one connected with the Tar trade. State salary required. Address ALPHA, care of Messrs. W. H. Smith and Son, Castle Street, LIVERPOOL.

MANAGER OF GAS-WORKS WANTED.

THE Bridgnorth Gas Company, Limited, will shortly have a vacancy for a Manager of their Gas-Works. Annual make of gas about 12 millions. Salary, with house, coal, gas, and garden free, £2 2s. per week. Applications to be sent in by the 18th of August. For further particulars apply to the SECRETARY, Mr. J. H. Cooksey, Town Clerk's Office, BRIDGNORTH.

TAR WANTED.

THE Advertiser is prepared to Purchase at once, about 1000 Casks of COAL TAR. State price, delivered on rail, to No. 677, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ON SALE—The Cast-Iron Fire Doors, Mouthpieces, Ascension, H, and Dip Pipes, Hydraulic Mains, &c., belonging to six settings of six retorts; One Station Meter to pass 8000 feet per hour (makers West and Gregson); also nine D-shaped clay retorts, 16 in. by 14 in. by 8 feet. The above are in capital condition, and can be seen at the Gas-Works, Guildford. No reasonable offer refused. Further particulars on application to Mr. LONGWORTH, Gas Offices, GUILDFORD.

WANTED, a Photometer, new or second-hand, complete; in good working order. State kind, price, and other particulars to JAMES MEARNS, Gas-Works, Banbridge, IRELAND.

WANTED, a Second-hand Gas Tank and Holder, 40 ft. diameter, 14 to 16 ft. deep; in perfect order, complete ready for erection. Price to include delivery alongside ship, Liverpool or London. Tenders to be addressed No. 670, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—"King's Treatise on Coal Gas." Vols. 1 and 2. Vol. 1 bound; Vol. 2 unbound. Price 37s. 6d. Address L., Bookstall, South-Eastern Railway, RAMSGATE.

GAS PLANT FOR SALE.

THE Maidstone Gas Company having enlarged their Works, offer the following Apparatus for Sale in good condition:—

SCRUBBERS.—One Tower Scrubber 30 ft. high by 10 ft. diameter, with Distributor, and partly fitted with Livesey's boards.

CONDENSERS.—One Set of Annular Condensers, consisting of 9 Pipes 17 ft. high, outer diameter 2 ft. 6 in., fitted with 12-in. Valves complete.

ENGINES.—Two 12-Horse Power Horizontal Engines in very good condition.

STATION-METER.—By Milne and Son, in first-class condition, ornamental case, with Valves and Bye-pass complete; to pass 20,000 cubic feet per hour.

HYDRAULIC MAIN.—Six 8 ft. by 18 in. Hydraulic Main D wrought iron; 24 8 ft. 9 in. by 18 in. Hydraulic Main D wrought iron. Nearly new.

RETORTS.—31 Rounds, 15 in. diameter and 9½ ft. long, in two pieces. 2 Ovals, 21 in. by 15 in. and 9 ft. long, in one piece. All of Stourbridge Fire-Clay, and in good condition.

For further particulars and price apply to JOHN WEST, Engineer and Manager, Gas Works, Maidstone, April 21, 1880.

FOR SALE—Gasholder, 158 ft. by 30½ ft. in good condition (single, but could be telescoped) to be taken out early next year, and replaced by S. C. & Sons with a Treble Lift. Excellent Guide Framing, consisting of 20 handsome Columns and wrought-iron Girders. May be seen at work at the Gas-Works, Portsea.

Particulars on application to S. CUTLER AND SONS, Millwall, LONDON, E.

STATION-METER FOR SALE.

THE Gas Committee of the Corporation of Rochdale offer FOR SALE a STATION-METER, capacity 25,000 cubic feet per hour, 12-in. Connections, Hydraulic Valves and Bye-Pass, and all other necessary Fittings. The Meter is to be removed in consequence of extensions.

Any further information thereon can be had on application to Mr. Paterson.

Gas-Works, June 23, 1880.

GAS PLANT FOR SALE.

THE Buxton Local Board invite Tenders, addressed to the Chairman of the Board, for the Purchase of the following, which are thrown out of use in consequence of the erection of new Works:—

28 Mouthpieces, Lids, Screws, and Cross Bars, Stand, and H-Pipes, Hydraulic Main, &c., Condenser, consisting of 16 Vertical Pipes, 18 ft. by 6 ft., with Receiving Main.

Four Purifiers, 8 ft. by 8 ft. by 4 ft. 6 in., Dry Centre-Valve and 8-in. Connections, of recent date.

One Gasholder, 50 ft. diameter 16 ft. deep, Columns and Girders complete.

One Double-Lift Holder, 45 ft. diameter 18 ft. deep, Columns, Girders, and Balance-Weights and Chains, complete.

One Whimster's Exhausting and Washing Machine, with Engine, Bye-pass and Throttle Valves, and Governor for 10,000 ft. per hour, and Egg-end Boiler, 10 ft. by 4 ft., with fittings complete.

Station-Meter to pass 6000 ft. per hour, 8-in. Connections and Bye-pass complete.

The last three all new within six years.

One 6-in. and two 8-in. Governors, with Bye-pass to each. Five years old.

Further particulars may be obtained on application to Mr. G. Smedley, Sen., Engineer, Gas Offices, Buxton.

By order,
JOSIAH TAYLOR, Clerk to the Board.

Buxton, July 24, 1880.

THE Stretford Gas Company are pre- pared to receive TENDERS for the GAS TAR and AMMONIACAL LIQUOR produced at their Works, together or separately, for a period of Two or Three years, commencing on the 1st of November next.

Tenders to be sent in addressed to the Chairman, and endorsed "Tender for Tar, &c.," on or before Monday, Sept. 6 next.

The Directors do not bind themselves to accept the highest or any tender.

Arrangements can be made to load the same in boats alongside the Works.

BENJAMIN HAYNES, Secretary.

Stretford, near Manchester, July 17, 1880.

TAR AND AMMONIACAL LIQUOR.

THE Petworth Gas Company are pre- pared to receive TENDERS for the above, separate or together.

The Company will deliver on rail.

State price in purchasers barrels, of about 36 gallons.

Tenders addressed to the MANAGER, Gas-Works, PETWORTH.

THE GASLIGHT & COKE COMPANY.

Chief Office, Horseferry Road, Westminster, S.W.,
July 26, 1880.

NOTICE is hereby given that a HALF-YEARLY ORDINARY GENERAL MEETING of the PROPRIETORS in this Company will be held at this Office, on FRIDAY, the 13th day of August next, at Twelve o'clock (noon) precisely, to transact the usual business, including the declaration of a Dividend for the half year ending the 30th day of June last.

Notice is hereby also given that at such meeting the Directors will apply to the Proprietors for authority to dispose of such further portion of the Company's property as is not now required for the purposes of their undertaking.

By order,
JOHN ORWELL PHILLIPS, Secretary.

BARNET DISTRICT GAS & WATER COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the PROPRIETORS of the above Company will be held at the Gas-Works, New Barnet, on MONDAY, the 23rd day of August, 1880, at Two o'clock in the afternoon precisely, to receive the Report of the Directors, and the Accounts for the half year ending the 30th day of June last, to declare a Dividend, and to transact the general business of the Company.

The Transfer Books will be closed from the 9th to the 23rd inst., both inclusive

By order of the Board,
ALFRED LASS, Secretary.

Offices, 30, Gracechurch Street, London, E.C.
July 30, 1880.

THE Gloucester Gas Company, ceasing to manufacture gas at their old works, will have the undermentioned APPARATUS for Sale about the beginning of August, viz.:—

About 150 feet of D-shape Wrought-Iron Hydraulic Main, size 19 in. by 19 in. Also about 35 ft. of D-shaped Wrought-Iron Hydraulic Main, size 20 in. by 20 in. Annular Condenser, consisting of six Vertical Pipes, 24 in. diameter, 19 ft. high, with three 12-in. Slide-Valves and 12-in. Connections.

Scrubber (round), 5 ft. by 20 ft., with three 12-in. Slide-Valves, and 12-in. Connections.

Exhauster (Jones) to pass about 15,000 feet per hour.

Exhauster (Beales) to pass about 25,000 feet per hour.

Two Vertical Steam-Engines, each about 6-horse powe with Pulleys, and Shafting used for driving the above.

Boiler 14 ft. 6 in. by 8 ft. 6 in., with Centre Tube, and four Galloway Patent Tubes.

4-horse power Horizontal Steam-Engine.

Three 4-in. Pumps, with cranked Shafting and a pair of Mitre Wheels.

Two Purifiers, 16 ft. by 8 ft., with six 12-in. Slide-Valves and 12-in. Connections.

Gasholder, Double Lift, with Cast-Iron Tank, capacity 37,000 feet.

Gasholder, Double Lift, capacity 100,000 feet.

Gasholder, Double Lift, capacity 240,000 feet.

One 12-in. Governor, by Wright, London, with 12-in. Valves, Bye-Pass, and Connections.

Two 12-in. four-way faced Valves, by Cockey.

For further information, &c., apply to the undersigned.

R. MORLAND, Engineer.

WOOD
TROUGHING
For Preserving Service-Pipes.
Price from Three-Farthings per Foot
In any Lengths.

THOS. PROUD,
Brookfield Works, Icknield St., Birmingham

GEORGE ORME & CO.,
ATLAS METER-WORKS, OLDHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
STATION-METERS, GOVERNORS,
PRESSURE AND EXHAUST REGISTERS,
LAMP-METERS IN CAST-IRON BOXES,
And every Description of Gas Apparatus.

DOULTON'S
LAMBETH RADIATING TILE STOVES.

No Smoke. No Sweeping. No Smell.
No Attention. No Waste. No Cleaning.
No Fixing. No Dirt. No Dust.

For Studios. For Conservatories.
For Halls. For Schoolrooms
For Surgeries. For Waiting Rooms.

BURN FOR 12 HOURS WITH 5 POUNDS OF COAL.

DOULTON & Co., Lambeth Pottery, London, S.E.

May be had of the principal Ironmongers.

KNIGHTON, RADNOR.

THE Directors of the Knighton Gas Company are prepared to receive TENDERS for a Twelvemonth's supply of COAL, about 350 Tons, from the 1st of September next, to be delivered at Knighton Station (L. & N. W. R.), carriage paid, in such quantities and at such times as may be required.

Tenders to be sent in on or before the 17th of August.

The Directors do not bind themselves to accept the lowest or any tender.

WILLIAM A. COLLINS, Secretary.

Knighton, July 28, 1880.

CITY OF HEREFORD.

THE Gas Management Committee of the Hereford Corporation hereby invite TENDERS for the Purchase of the Surplus TAR produced at their new Works, from the 1st day of January, 1881, to the 1st day of June, 1883. The quantity will be about 200 tons per year.

The Committee will provide for the pumping into tank waggons, on rail in their sidings, which are in connection with the Great Western Railway.

Tenders, endorsed "Tender for Tar," are to be sent to the undersigned on or before the 23rd of August next.

The said Committee do not bind themselves to accept the highest or any tender.

By order,
WILLIAM DAVIS, Engineer.

Gas Office, Hereford, July 27, 1880.

TO COLLIERY PROPRIETORS, COAL MERCHANTS, AND OTHERS.

THE Directors of the Alton Gas and Coke Company invite TENDERS for the Supply of 750 Tons of Good GAS COALS, to be delivered, carriage paid, on rails at Alton Station (L. & S. W. R. Co.), in quantities as under:—

200 Tons during the month of September, 1880.			
250	,,	December	,,
200	,,	February, 1881.	
100	,,	March,	,,
750			

The Coal to be of good quality, free from bats, bind, pyrites, and other refuse.

Tenders to state from what colliery the coals are obtained.

Terms of payment, cash at a month.

The Directors do not bind themselves to accept the lowest or any tender.

Tenders to be sent in not later than Monday, Aug. 9, 1880.

H. W. ELLIOTT, Secretary.

THE ISLE OF THANET GASLIGHT AND COKE COMPANY.

TO TAR CONTRACTORS.

THE Directors of the Isle of Thanet Gas Company are prepared to receive TENDERS for their Surplus TAR at the Margate Works, for One year ending June 30, 1881. Coals carbonized, 6000 tons. The Company will undertake to fill the barrels or tanks when left on their premises, but all other expenses to be paid by the Contractor.

The Directors do not bind themselves to accept the highest or any tender.

Further information will be given on application to the Manager, Mr. F. Doughty.

Tenders to be addressed to the Chairman of the Company, The Dane, Margate, and sent in on or before Thursday, Aug. 12, 1880.

THOMAS C. FULLER, Secretary.

Margate, July 30, 1880.

TO BUILDERS, GAS APPARATUS MANUFACTURERS, AND OTHERS.

THE Teignmouth Local Board are ready to receive TENDERS for the EXTENSION of their GAS-WORKS by Building a Manager's Dwelling-house, Boundary Wall, and Coal Store, and providing and fixing Condensers, Scrubbers, Purifiers, Station-Meter, Governor, Horizontal Engine, Boiler, &c.

Plans and Specifications may be seen and particulars may be obtained of THOMAS DAND, C.E., Castle Street Chambers, Exeter.

Sealed Tenders endorsed "Tender for Gas-Works Extensions," to be delivered at my Office on or before Monday, Aug. 9, 1880.

The Local Board do not bind themselves to accept the lowest or any of the tenders.

By order of the Teignmouth Local Board,
W. R. HALL JORDAN, Clerk.

Teignmouth, July 27, 1880.

HEYWOOD GAS-WORKS.

TO ENGINEERS AND IRONFOUNDERS.

THE Heywood Local Board invite Ten- DERS for the following:—

Contract No. 2.—The Cast-Iron Columns, Main and Secondary Beams and Girders, &c., required in the Erection of a Purifying House, and the fixing of same.

Contract No. 3.—The wrought and cast iron work, &c. of a Purifying House Roof and the erection of same.

The Drawings and Specifications may be seen at the Board's Offices, and at the Offices of the Engineer, Mr. Thomas Newbigging, 5, Norfolk Street, Manchester.

Copies of the Specification, bills of quantities, and forms of tender may be obtained from the Engineer on payment of one Guinea for each contract, which will be returned on receipt of a *bona fide* tender.

Sealed tenders, endorsed, "Purifying House, Contracts Nos. 2 and 3," to be addressed to the Chairman of the Gas Committee, and delivered to me not later than the 12th of August.

The Board do not bind themselves to accept the lowest or any tender.

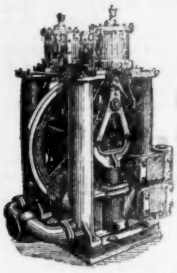
By order,
JOHN BANKS, Clerk to the Board.

Offices, Heywood, July 29, 1880.

R. ANDREWS, Retort Setter, 17 years practical experience. Estimates given for Building new Benches.

References and prices on application at 119, Elsley Road, Shaftesbury Park Estate, LONDON, S.W.

John Cameron's Specialities



ARE HIS

PATENT LEVER

PUNCHING MACHINES

AND HIS

STEAM-PUMPS

FOR

GAS-WORKS,

Feeding Boilers, Steam Fire-Engines, Colliery Deep Lifts, Irrigation, Contractors, and Chemical purposes.

WORKS:

OLDFIELD ROAD, SALFORD, MANCHESTER.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

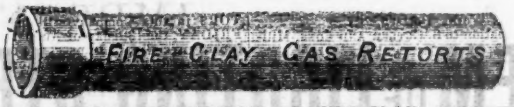
Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

JOHN HALL AND CO., STOURBRIDGE,

Manufacturers of FIRE-BRICKS, LUMPS, TILES,



AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

Now ready, Second Edition, price 7s., by post 7s. 3d., the

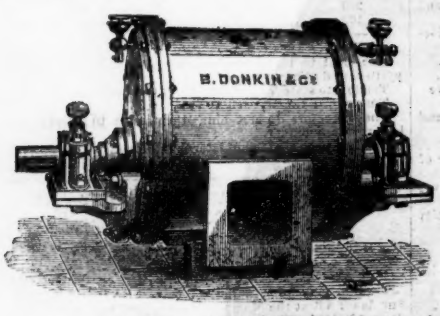
GAS MANAGER'S HANDBOOK.

By THOMAS NEWBIGGING, M.I.C.E.

Orders to be sent to

WALTER KING,

11, BOLT COURT, FLEET STREET, LONDON, E.C.



NEW PATENT GAS-EXHAUSTERS.

[J. BEALE'S.]

MESSRS. B. DONKIN & Co. possess the sole right to manufacture J. Beale's Exhausters under his new patent.

MADE WITH TWO OUTSIDE BEARINGS AND LATEST IMPROVEMENTS.

ALSO MANUFACTURERS OF

IMPROVED GAS AND WATER VALVES, STEAM-ENGINES, &c., &c.

B. DONKIN & Co., BERMONDSEY, LONDON.

ECONOMY IN THE PRODUCTION OF GAS.

PLUTONIC CEMENT,

FOR JOINTING AND REPAIRING RETORTS AND OVENS *in* ACTION AND *out* OF ACTION.

Pamphlet on the advantages of the above, with Modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,

WILLIAM RICHARDSON, Gas and Hydraulic Engineer, CHARLES HENRY STREET, and BISSELL STREET, BIRMINGHAM.

WARNER'S RETORT-HOUSE MACHINERY.

[*As Illustrated and Described in the* JOURNAL *for May* 4.]

Communications to be addressed to

W. J. WARNER, GAS-WORKS, SOUTH SHIELDS.

Now Ready, Price One Guinea,

PRECEDENTS IN PRIVATE BILL LEGISLATION

AFFECTING GAS AND WATER UNDERTAKINGS.

COMPILED BY MR. G. W. STEVENSON, C.E., F.G.S.

LONDON: WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

NO MORE WASTE LIME! SAVE THE VALUABLE PRODUCT!

G. R. HISLOP'S PATENT REGENERATIVE PROCESS

Most Effectively and Economically restores this waste *ad infinitum*.

The Patentee having devoted more time and attention to this subject than perhaps any other person living, is now in a position to recommend the adoption of this process to Gas Companies and Corporations with the utmost confidence in its practical utility, convenience, and economy. 1st. It restores the spent Lime at from one-third to one-half its original cost, apart from its undoubted convenience and the economy of space. 2nd. There is practically no limit to the duration of the Lime. 3rd. The cost of apparatus for the introduction of the process is very moderate and exceedingly durable. 4. The Patentee supplies special bricks and castings, erects and proves the process on the most favourable terms.

The process, in operation, may be seen at the Corporation Gas-Works, Paisley, where the Lime has been restored 120 times. Inspection is cordially invited.

For Terms, apply to GEO. R. HISLOP, F.C.S., Engineer, Gas-Works, PAISLEY, N.B.

WILLIAM SUGG'S

IMPROVED

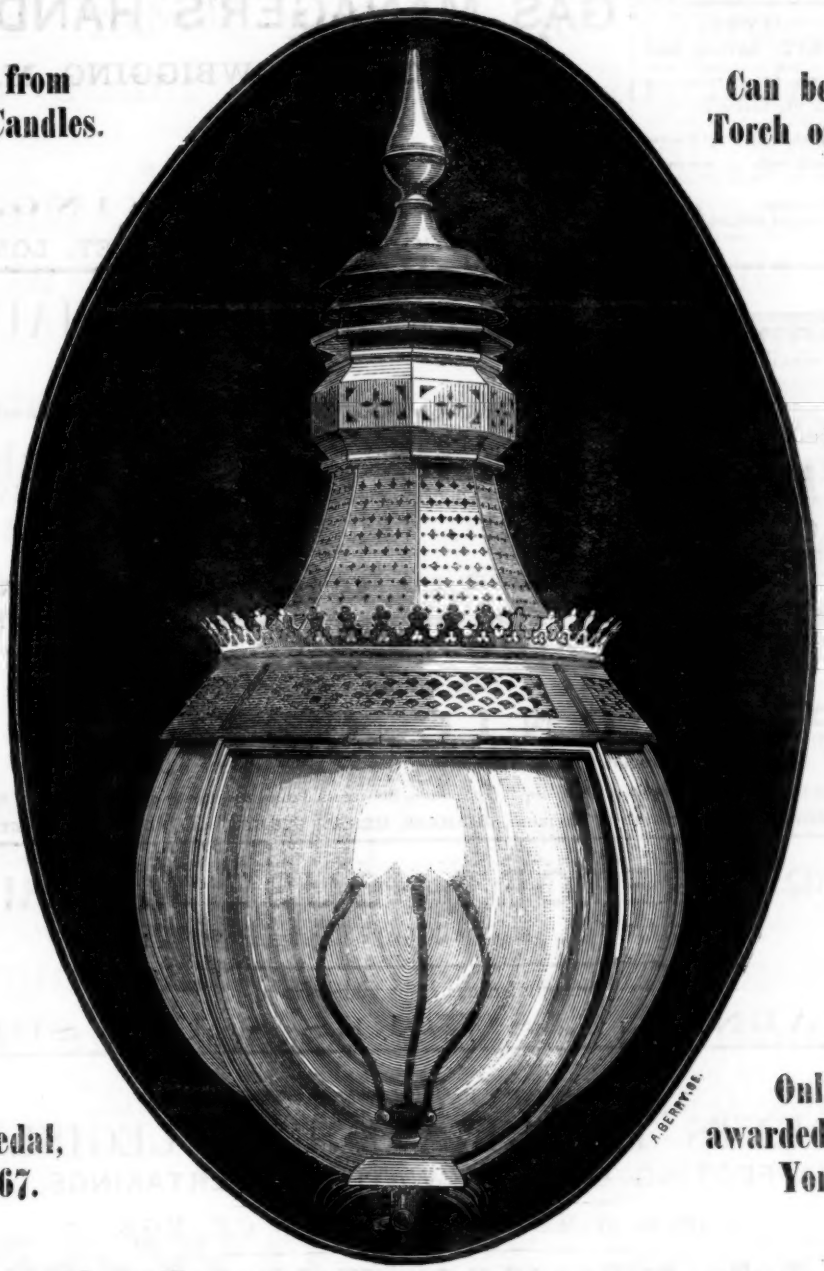
SYSTEM OF LIGHTING STREET REFUGES, &c.,

With Patent Shadowless Lanterns and Flat-Flame Burners of High Illuminating Power, suitable for Cannel or Common Gas.

THE "CITY OF LONDON"

Sizes vary from 50 to 100 Candles.

Can be lighted by Torch or Centre Jet.



Two Gold Medals,

Paris, 1878.

CLASSES 13 & 31.

LONDON, 1862.

Two Gold Medals,

Paris, 1878.

CLASSES 13 & 31.

LONDON, 1862.

Bronze Medal, Paris, 1867.

Only Medal awarded for Burners, York, 1879.

PATENT FLAT-FLAME LANTERN,

(REGISTERED DESIGN,)

Made the following Powers of Light, 50, 80, and 100 Candles.

FOR PRICES AND PARTICULARS APPLY TO

WILLIAM SUGG, ENGINEER,

GRAND HOTEL BUILDING, CHARING CROSS, & VINCENT WORKS, WESTMINSTER,

And 12, Rue St. Roch, Paris.

WET GAS-METERS.

DRUM v. INDEX.

The index of a Gas-Meter records the number of revolutions made by the measuring drum.

The measuring drum ought, therefore, to pass the same volume of gas at every revolution.

The ordinary meter-drum, instead of doing this, varies in its capacity with every change of water-line. It is, therefore, out of harmony with the index, which is constructed for one capacity only. The

WARNER AND COWAN DRUM

has no such defect. It is a measure of practically fixed and unvarying capacity. The index which registers the number of its revolutions at the same time records the exact quantity of gas passed.

W. & B. COWAN,

(ESTABLISHED 1827,)

ORIGINAL LICENSEES AND MANUFACTURERS OF

WARNER & COWAN'S SELF-REGULATING GAS-METERS,

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ROBUS'S IMPROVED RETORT-SETTINGS, guaranteed to Carbonize a large amount of Coal with a small per cent. of Fuel.

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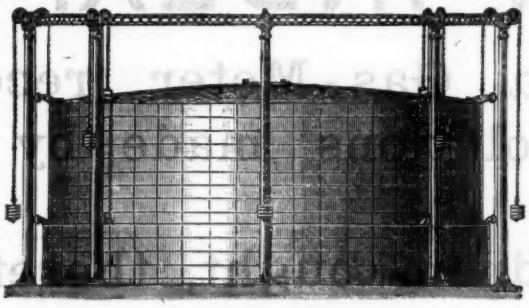

J. T. B. PORTER & CO.,

GAS ENGINEERS & MANUFACTURERS,

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GOWTS BRIDGE WORKS,

LINCOLN.

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ESTIMATES FOR GAS-WORKS OF ANY SIZE.

REFERENCES TO 500 WORKS ALREADY ERECTED.

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Wholesale and for Exportation,

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DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for

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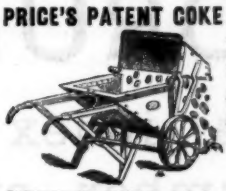

effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.

Prices are Reduced.

S. PONTIFEX & CO.,

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Supply and Erect Street Lamp Columns, together with Head Irons and Lanterns, as well as all the other fitting connected therewith.

S. P. & Co. also contract with Gas, Railway, and other Companies, Local Boards, and Vestries, for the maintenance and repair of Lamps and Fittings.

IMPORTANT to GAS COMPANIES.

ENORMOUS SAVING.

JOHN ABBOT & CO., LIMITED,

OF SUFFOLK LANE, LONDON, AND GATESHEAD,

Manufacture and Erect

HYDRAULIC CRANES

For Discharging Coal Barges;

WAGGON HOISTS

For Lifting Coals to Retort-House Stageway;

CAPSTANS

For Moving Trucks about the Yard,

And Apparatus for Lifting PURIFIER COVERS.

Examples to be seen at Beckton, Hull, &c., &c.

ALDER AND MACKAY,

MANUFACTURERS OF

IMPROVED WET AND DRY GAS-METERS

IN CAST-IRON AND TIN CASES OF THE HIGHEST EXCELLENCE.

Original Manufacturers of Dry Meters in Cast-Iron Cases.

STATION-METERS, EXPERIMENTAL-METERS, PHOTOMETERS, & PRESSURE-GAUGES, &c.

GRANGE WORKS, EDINBURGH.

HANNA, DONALD, & WILSON,

(ESTABLISHED 1851,)

GAS ENGINEERS & CONTRACTORS

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ERECTION OF GAS AND WATER WORKS,

TELESCOPIC AND SINGLE-LIFT GASHOLDERS,

CAST AND WROUGHT IRON GASHOLDER-TANKS,

IMPROVED FIXED OR TRAVELLING HYDRAULIC PURIFIER-COVER LIFTERS,

PURIFIERS, CONDENSERS, SCRUBBERS, EXHAUSTERS, AND PUMPING-ENGINES,

TAR AND LIQUOR PUMPS, HYDRAULIC SLUICE AND SLIDE VALVES, LAMP-POSTS AND HYDRANTS COMBINED.

DESIGNS AND ESTIMATES SUPPLIED ON APPLICATION.

London Office: 9, FENCHURCH STREET, E.C.

ABERCORN FOUNDRY & ABBEY WORKS, PAISLEY, N.B.

The understated declaration with which we introduced our apparatus when the Argand system was in the full tide of its fame, has been fully borne out by general experience, namely—

"THE FLAT-FLAME IS THE ONLY PRACTICABLE SYSTEM FOR STREET LIGHTING; and, 'in actual use,' yields as much light with Common Gas, and more with Cannel Gas, than any Argand System."

CHARLES HUNT, Esq. (President of the British Association of Gas Managers), in his Inaugural Address to the members at their annual meeting, held in London, June, 1880, said: "Rivalry has stimulated into being, for outdoor purposes mainly, Burners of large power, that have fully maintained the superiority of coal gas over the electric light. To Mr. Bray our thanks are due for his development of the FLAT-FLAME BURNER into a lighting medium of a very high order, *and for his vindication of its claims to practical consideration.*"

The above declaration was received with marked applause by the crowded meeting.

BIRMINGHAM LAMP TESTS.

AFTER the most exhaustive series of experiments, extending over more than twelve months, with the most extensive assortment of Burners and Lanterns of large lighting power ever brought together, the Birmingham Authorities have

ADOPTED BRAY'S SYSTEM

for their Street-Lighting Improvements, for which purpose Sixty-Five 100-candles power Lanterns of medium lighting power are being fixed.

The apparatus used in the above tests were all of our usual medium lighting power class, and the tests showed that we sacrifice a considerable amount of lighting power for general efficiency. The tests further showed that our 80*-candles* HIGHEST *lighting power burner yielded* 3·51 *candles per foot of gas—the quality being* 16·75 *candles* (3·35 *per foot*) *by the standard—which was a higher result than that yielded by any other flat-flame burner, though copies of our Slit-Unions, enlarged and improved by us Jan.,* 1879, *were used by our competitor; and higher than the* 80*-candles power Argands.*

NOTE.—The above is the most conclusive answer to the ever-changing and misleading statements which are being made by our competitor, with the object of taking from us the honours we have secured in open contest.

Extract from the *Leeds Mercury*, April 1, 1880.

At the meeting of the Leeds Town Council, March 31, Alderman Gaunt moved that the Council approve of the acceptance by the Corporate Property Committee of the tender of Messrs. Geo. Bray and Co. for the supply of 21 new lamps, to be placed upon the pillars round the Town Hall. The Committee had tested Sugg's and other lamps, and found Messrs. Bray's the best. It was intended to have two 200-candles power and two 100-candles power, and 17 round the hall of 80-candles power. Mr. Lynd, in seconding the motion, said that he had had an opportunity of seeing different lamps tested at Birmingham, and he was in favour of Messrs. Bray's.

Extract from the *Daily Free Press*, Aberdeen, Jan. 1, 1880.

Judging of the merits of the lights as they appeared last night, on-lookers seemed to be generally of opinion that between Sugg's patent and Bray's larger light at the corner of Union Buildings, Castle Street, there was no perceptible difference in the illuminating power. When the vital question of gas consumption is taken into account, it is found that in the Castle Street lamps there is a marked difference in the quantity of gas consumed, for while 30 feet of gas are hourly burned in Sugg's Patent Lamp, only 20 feet are used by Bray's Lamp during the same period.

[**The above Lamps have Meters attached.**]

BRAY'S LANTERNS have been adopted by the Vestry of St. George, Hanover Square, London, for all the crossings and refuges of that important district, after a direct competition with the Argand system of lighting.

Also more than 50 Towns and Vestries have adopted them, after a similar competition in most cases; and many private users. In all cases they are a pronounced success.

GEORGE BRAY & CO., BLACKMAN LANE, LEEDS.

June, 1880.

F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

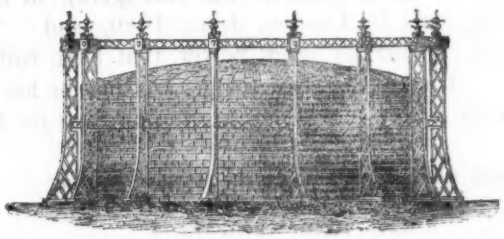
ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.



THE HORSELEY COMPANY,

LIMITED,

TIPTON, STAFFORDSHIRE.

LONDON OFFICE:

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GAS ENGINEERS, IRONFOUNDERS, &c.,

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GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,

AND ALL REQUISITES FOR EITHER

GAS OR WATER WORKS;

ALSO

MAKERS OF ROOFS, BRIDGES, &c.

S. OWENS & CO.,

WHITEFRIARS STREET, LONDON, E.C.,

HYDRAULIC ENGINEERS,

AND MANUFACTURERS OF

PUMPING MACHINERY of every Description.

SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF

BLAKE'S PATENT STEAM-PUMPS.

More than 10,000 in use,

ESPECIALLY ADAPTED FOR USE IN GAS AND CHEMICAL WORKS, FOR PUMPING TAR, WATER, AMMONIACAL LIQUOR, ACIDS, &c.

The following are some of the prominent advantages of the BLAKE PUMP:—

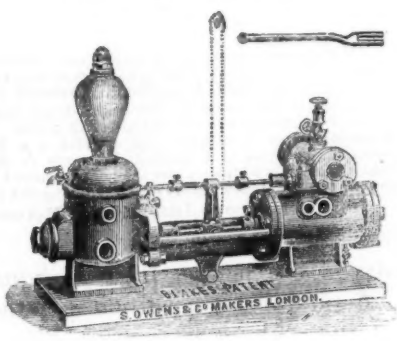
It will start at any point of stroke.

It has no dead point.

It works fast or slow, with the same certainty of action.

It is economical. Has a lead on the slide-valve.

It is compact and durable.



It is interchangeable in all its working parts.

It will deliver more water than any other pump.

It is made of best materials in the most workmanlike manner.

Can be worked at 20 strokes per hour, or 200 strokes per minute.

This Illustration represents Boiler-Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.

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NORWOOD, NORTHENDEN ROAD,

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SPECIAL ACCOUNTANT FOR GAS AND WATER UNDERTAKINGS,

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Accounts Analysed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by Mr. Lass to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, Corporations, and Local Boards.

JOHN ROMANS, C.E., F.G.S.E.,

CONSULTING GAS ENGINEER

AND

CANNEL COAL FACTOR,

30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

GAS-WORKS TAKEN ON LEASE.

Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

ANALYSIS AND PRICES FORWARDED ON APPLICATION.

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MANUFACTURER OF

WOOD GRIDS

FOR

PURIFIERS AND SCRUBBERS,

AND

GENERAL STEEL AND IRON TOOLS AND MATERIAL USED IN GAS-WORKS.

BOX'S PATENT STREET GAS-LAMP

Has the following good qualities:—

1. No putty or other material is required for glazing. Thus there is no hacking out of old putty on removal of the glass, with the *consequent damage* to the lamp frames. 2. No liability to breakage by unequal expansion of the glass caused by changes of temperature. 3. Any inexperienced workman can glaze the lamp in a few minutes. 4. The system of glazing can be applied to any existing lamp at a trifling cost. 5. It is cheap, strong, and durable. 6. The glass can be easily removed so that the frames can be thoroughly painted inside and out.

The lamp may be supplied fitted with clear opal or ribbed glass, *as also with enamel tops* if required. The necessary fittings for altering existing lamps to this system can be supplied at moderate prices and a small charge for royalty. Licences granted on the most reasonable terms. For further particulars apply to the Patentee, W. W. Box,

Gas-Works, Crayford, Kent.

RETORT BOLTS,

AND ALL KINDS OF

BOLTS AND NUTS,

SUITABLE FOR

GAS-WORKS,

SUPPLIED BY

JOHN STANSFELD,

Bolt & Nut Manufacturer,

ALFRED ST., BOAR LANE, LEEDS.

THE MANN & WALKERS' PATENT SCRUBBER.

Extensive use. The successful and extensive use of the Mann and Walkers' Patent Scrubbers in all parts of the world has demonstrated their advantages, and entitled them to be received with credit and confidence. The number of them in use is about twenty times that of any other known means of purifying gas from ammonia.

Small quantity of Water required. By a very small quantity of clean water (not more than 5 or 6 gallons per ton of coals carbonized) the whole of the Ammonia contained in the Gas is completely absorbed; the Gas, after only once passing through, issuing from the Scrubber outlet completely purified from Ammonia. The Scrubber gives no appreciable back pressure.

Residual Product obtained. The Residual Product—namely, the Ammoniacal Liquor—is obtained at from 20 to 30 ounces commercial strength, which enables it, after being mixed with the weaker Liquor from the hydraulic main and condensers, to be sold to the Manufacturing Chemists, or converted into Sulphate, at the degree of strength found most profitable to the Gas Company.

Illuminating power increased. The Scrubber is a Saturator, and the Gas being soaked in this strong solution of Ammonia in the lower columns of the Scrubber, is purified from a large amount of Carbonic Acid, and its Illuminating Power is thereby increased.

Small amount of power required. The friction is so little, and the motion so slow, that the power necessary to work the Scrubber is almost inappreciable. A small gas-engine will work a pair of Scrubbers, purifying 2 million cubic feet of gas per day.

Beckton Gas-Works. There are thirty of these Patent Scrubbers in the Beckton Gas-Works, equal to purifying 30 million cubic feet per day, and the total amount of engine power necessary to work the whole 30 is not equal to that given out by one 10-horse engine.

Reserve purifying power contained. There is also a most important advantage arising from the height of these Scrubbers, in the reserve force contained in them. In the event of any stoppage, the mass of soaked and wetted material would continue the purification for hours, even if the supply of water and working were stopped from any cause.

Internal Materials not changed. The changing of the soaking materials in these Scrubbers is very seldom required; they are well known to remain in action for seven years without being emptied.

Guarantee They are in all cases erected under guarantees; they easily fulfil the stipulations of any Act of Parliament, and the chemical restrictions of the Board of Trade; and in cost they are much less to a Gas Company than any other known means of purifying Gas from Ammonia.

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Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

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STATION-METERS GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

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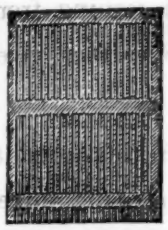

WOOD SIEVES FOR PURIFIERS,

WITH TAPER OR PARALLEL BARS,

MADE BY SPECIAL MACHINERY.

SCRUBBERS FILLED WITH BOARDS,

On our approved principle, for the extraction of Ammonia.

Prices on application. References to First-Class Engineers.

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GLOBE METER-WORKS, OLDHAM,

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WET AND DRY CONSUMERS GAS-METERS,

OF THE HIGHEST EXCELLENCE ONLY;

ROUND STATION-METERS,

ON CAST-IRON STANDS;

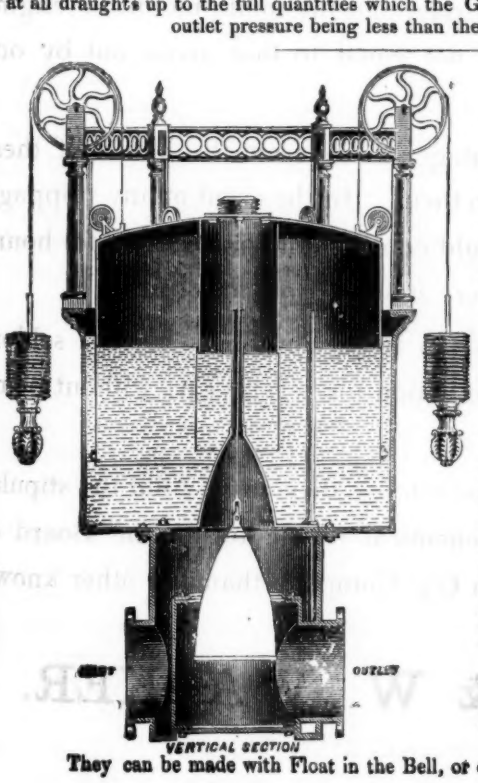
SQUARE STATION-METERS,

WITH PLANED JOINTS.

Messrs. BRADDOCK beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 30-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

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WOOD PURIFIER SIEVES.

Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

MIDLAND IRON-WORKS,
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MOBBERLEY & PERRY,

FIRE CLAY and BRICK WORKS,
STOURBRIDGE.

Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAY.
Manufacturers for Home and Export.
GAS-RETORTS, GLASS-HOUSE FURNACE,
BLAST-FURNACE, TANK BRICKS, LUMPS, TILES,
And Every Description of Best Fire-Bricks.

TROTTER, HAINES, & CORBETT,

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FIRE CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.
Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

ESTABLISHED IN 1860.

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WOOD SIEVES

FOR

GAS PURIFIERS & SCRUBBERS.

PROVIDENCE WORKS,
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ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 21 & 22, WHARF ROAD,
CITY ROAD, LONDON, N.,

Manufacture and keep in stock at their works (also a large stock in London) PIPES and CONNECTIONS 1½ to 48 inches in diameter; and make to order Retorts, Purifiers, and Tanks, with or without planed joints, Columns, Girders, Special Castings, required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Syphons and Covers are joint-faced if required, doing away with millboard and iron boring, or Syphons made without Covers, a socket being cast on and fitted with a small plug about 6 inches in diameter with lead joint. In either way preventing leakage.

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Patent Gas Calorigen,

A STOVE FOR

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RECOMMENDED BY DR. RICHARDSON.

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MANUFACTURERS OF

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STEEL OF ALL DESCRIPTIONS,
SCREW STOCKS, TAPS, AND DIES, SPANNERS
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TREES BOGHEAD.

SHOTTS BOGHEAD,

And all the first-class Scotch Cannels.

Prices and Analyses on application.

HEBBURN MAIN GAS COAL.

This Coal is now highly approved of for gas making, and yields over 10,000 feet per ton of 15-candle gas, and about 14 cwt. coke.

For references and prices, either f. o. b. or by rail, apply to

W. RICHARDSON,

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WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.

John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

GAS COAL.

THE MIRFIELD COAL COMPANY are supplying GAS COAL of the best quality on trucks at their siding. This Coal contains 10 per cent. of Cannel, and, as analyzed by Mr. James Paterson, of Warrington, yields 12,600 *cubic feet of 16·67-candle gas, with 1430 lbs. of good Coke, per ton.* Ash in Coke, 1·88.

Apply to the MIRFIELD COLLIERY, Mirfield, NORMANTON. London Agent: Mr. F. J. LEE SMITH, Bromley, KENT.

GAS COAL.

THE Tawd Vale Colliery Company, Limited, are prepared to Contract for the Supply of their superior Arley and other GAS COALS, and to send samples to the order of Gas Engineers and others, or complete Analysis, on application. Shipped at Liverpool, Preston, Fleetwood, Garston, or Birkenhead.

Mr. James Paterson, C.E., F.G.S., in his analysis of T. V. Arley Coal, says: "Some parts merge into a semi-Cannel; gas per ton, 10,300 cubic feet; illuminating power, 16·96 candles; coke of high quality, 1431 lbs. per ton."

Collieries, Skelmersdale, near Ormskirk; Offices, 5, New Hall, Old Hall Street, LIVERPOOL.

BIRTLEY IRON WORKS,

CHESTER-LE-STREET,

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Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Agent in London, Mr. J. MANWARING, 101 Cannon Street, E.C.

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Near SHEFFIELD,

Manufacturers of THE ORIGINAL SILICA OR DINAS FIRE-BRICKS. Specially adapted for Gas-Retort Furnaces and for Siemens's Gas-Furnaces. Shipments promptly executed to London, Liverpool, Hull, Grimsby, &c.

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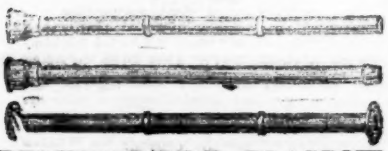
CAST-IRON GAS AND WATER PIPES.



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Prices on application.

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148, GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,

AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL,

AND

NEWTON, CHAMBERS, & CO.'S SILKSTONE GAS COALS.

Analyses and Quotations on application.

WILSON CARTER AND PEARSON,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station or for Export all kinds of Fuel for Gas purposes.

Address—**CHIEF OFFICES.**

TEMPLE BUILDINGS, 50, NEW STREET, BIRMINGHAM.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

35A, GREAT GEORGE STREET,

WESTMINSTER, S.W.,

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Twenty-Eight Illustrations and Letterpress, on the Construction of Gas-Works, will be sent, post free, on receipt of 4s. in stamps To be had of the AUTHOR; or at the Office of the "JOURNAL OF GAS LIGHTING."

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

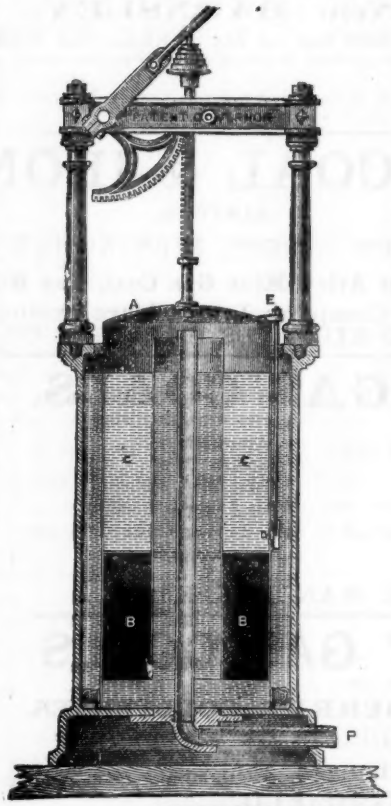
35a, GREAT GEORGE STREET, WESTMINSTER, S.W.

GEORGE WALLER & CO.,

GAS AND HYDRAULIC ENGINEERS,

Patent Compensating Steam Governor,

WITH SELF-CONTAINED WATER-BALANCE.



This is the most efficient and perfect Governor yet made to control and regulate the speed of Engines and Exhausters according to the varying make of gas, and maintain a steady gauge, whether working level or with six inches of seal.

It is the only Governor that will effectually control Condensing and Compound Engines, especially when the Exhauster is on light work, and the Engine is large.

During the drawing and charging of Retorts, the Engine requires no attention—a matter of great importance in small works.

Descriptive Circular sent on application

They are in use at

BECKTON,
HAMPTON WICK,
DUKINFIELD,
HARTLEPOOL,
NEWCASTLE-ON-TYNE,
RAMSGATE,
SUTTON,

and about 30 other works.

G. W. and Co. make **special Steam Throttle Valves,** suitable for working with this Governor, and alter existing Throttle Valves to same plan.

See also advertisement, page 188.

PHŒNIX ENGINEERING WORKS,

Holland Street and Bear Gardens, Southwark, S.E.

HONOURABLE MENTION.

PARIS EXHIBITION, 1878.

J. E. WILLIAMS & CO.,

SOLE MANUFACTURERS OF THE

SPECIAL METALLIC OXIDE PAINT,

Largely used by Gas Companies, Corporations, Railway Companies, Ironfounders, and Machinists.

HONOURABLE MENTION.

PARIS EXHIBITION, 1878.

It has the following qualifications and properties:—

Effectually prevents and arrests corrosion.
Has a fine gloss, and is very durable.
Does not require driers like other paints.
Protects iron from action of water.

Is not affected by sulphuretted hydrogen.
Forms a very hard, tough (not brittle) surface.
Will not crack, blister, or scale.
Is not affected by extremes of temperature.

Covers nearly double the area of other paints.
(7 gallons or 1 cwt. will cover 1211 square yards of ironwork.)
Is cheaper and more economical than any other.

VICTORIA PAINT WORKS, COLLYHURST, MANCHESTER.

ALDWARKE MAIN AND CAR HOUSE COLLIERIES,

Near ROTHERHAM.

JOHN BROWN & CO., LIMITED,

ATLAS STEEL AND IRON WORKS, SHEFFIELD.

PROPRIETORS.

The Aldwarke Main Brights is a first-class gas-making and coking Coal, yielding by analysis 12,600 feet of 19-candle gas per ton, and giving "Weight of illuminating matter in lbs. of sperm, 820·80." It is very free from impurities and foreign matter.

Copies of Analyses made by Gas Companies who have used it will be forwarded and Samples sent on application.

THE LOCHORE & CAPLEDRAE CANNEL COAL COMPANY,

Limited,

Beg to intimate that the development of their Mines is progressing favourably, and that they are now in a position to supply their famous Cannels.

Quotations and full Analyses will be supplied on application addressed to the Company,

LOCHGELLY, FIFESHIRE, N.B.

Abstract of Analyses made by Dr. WALLACE, Gas Analyst for the City of Glasgow.

	Cubic Feet per Ton.		Illuminating Power.		Equivalent of a Ton in Sperm.
Plesio Boghead	13,165	....	36·16	....	1632
Brown Capledrae	12,210	....	38·46	....	1610

GAS COAL. GAS COAL. GAS COAL.

WELLS, BIRCH, RYDE, and CO., Limited,

HOYLAND SILKSTONE COLLIERIES,

Near BARNSLEY.

This Company is now in a position to raise **2000 tons per day of REAL OLD SILKSTONE GAS COAL.**

"The quality of this Coal for Gas purposes, if equalled, is not excelled by any on record, and the Coke competes successfully with best Durham."—See *Mining Journal*, Aug. 11, 1877.

Prices quoted to any Railway Station, or F.O.B. Hull, Grimsby, Goole, Keadby, Liverpool, and Fleetwood.

Full particulars will be sent on application to above address.

THE WIGAN COAL & IRON COMPANY,

LIMITED.

MIDLAND DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: A. C. SCRIVENER,

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

CANNEL AND GAS COALS.

THE DUKINFIELD COAL AND CANNEL COMPANY are prepared to deliver, to any Station, their Celebrated GAS COALS, which have a very high reputation for quantity of Gas and Illuminating Power, and make a First-class Coke.

Analyses and terms of delivery may be obtained by communicating with the above Company, at their Offices,

DUKINFIELD, NEAR MANCHESTER.

LONDONDERRY GAS COALS

DIRECT FROM THE

MARQUESS OF LONDONDERRY'S COLLIERIES.

COUNTY OF DURHAM.

For Prices and Particulars, apply to

MR. S. J. DITCHFIELD,

LONDONDERRY OFFICES, SEAHAM HARBOUR, COUNTY OF DURHAM.

London Agents: Messrs. LAMBERT BROS., 85, GRACECHURCH ST., E.C.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & CO., GHENT, will receive immediate attention.

STEPHEN HOBBS,

OF

CLARENCE VILLA, RAMSGATE,

CONTRACTOR FOR WELL SINKING

AND

SEWERING WORK GENERALLY.

Begs to inform Engineers and others that he has just completed the extensive and important excavations, amounting to 4000 cubic yards, for the Ramsgate Improvement Commissioners (under the direction of their Engineer, Mr. Valon), whereby a good and abundant supply of water has been obtained, and is now in a position to undertake further work in town or country.

References kindly permitted to be made to MR. WILLIAM A. VALON, C.E., RAMSGATE. Additional testimonials if required.

NEW PATENT WET GAS-METER,
THE "RELIANCE,"
MANUFACTURED BY THE
GAS-METER COMPANY, LIMITED,
238, KINGSLAND ROAD, LONDON; UNION STREET, OLDHAM; HANOVER STREET, DUBLIN.
SOLE AGENT FOR SCOTLAND: JAMES KEITH, EDINBURGH AND ARBROATH.

The object attained by this invention is the *correct measurement of Gas under every fluctuation of the pressure.*

Accuracy is obtained by subjecting the whole of the water which determines the measuring chambers of the drum to one uniform even pressure, and so prevents unequal displacements of the water-line.

The "RELIANCE" METER has been tested by several of the most experienced official meter inspectors. Copies of their reports may be obtained on application to the

GAS-METER COMPANY, LIMITED,
238, KINGSLAND ROAD, LONDON.

HARCOURT'S COLOUR TESTS
FOR
SULPHUR AND CARBONIC ACID IN COAL GAS.

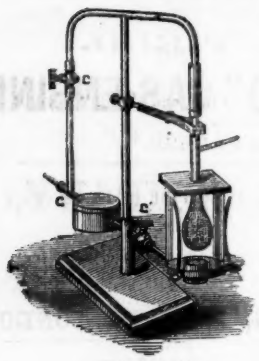


Fig. 1.

The improved instrument shown in Fig. 1 is provided with a Governor, G, whereby the flame below the bulb is prevented from varying in length, and the risk of fusing or cracking the bulb avoided.

Fig. 2 shows an arrangement by Mr. F. D. Marshall. The bulb is enclosed in a copper vessel, H, which is surmounted by a cover fitted with a high temperature thermometer, T, the indications of which enable the operator to adjust, by means of the Governor, G, the consumption of gas from the burner, B, below H, to the rate required to produce a constant, or any desired temperature within the vessel H and its enclosed bulb.

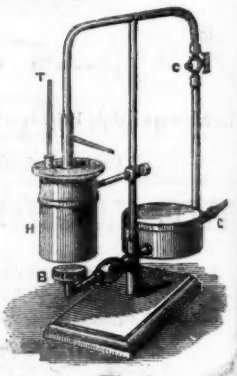
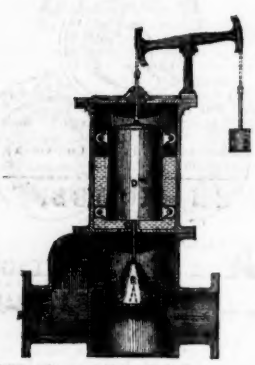


Fig. 2.

ALEXR. WRIGHT & CO.,
55, 55a, and 56, MILLBANK STREET, LONDON, S.W.

R. LAIDLAW AND SON,
EDINBURGH AND GLASGOW.
Manufacturers of
CONSUMERS IMPROVED WET GAS-METERS,
THE UNVARYING WATER-LINE GAS-METERS,
IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;
STATION-METERS, ALL SIZES, with PLANED JOINTS;
Experimental Meters, Photometers, Pressure-Gauges, Governors, Test Holders, &c., &c.
LONDON OFFICE:
6, LITTLE BUSH LANE, CANNON STREET, E.C.

PEEBLES'S
PATENT GAS GOVERNORS,
FOR
Stations, Districts, Public Lamps, & Dwelling-Houses,
Are meeting with increasing favour, and giving full satisfaction where they are in use.


Patent Safety Station-Governor.

Wet and Dry Gas-Meters of Superior Excellence, Station-Meters, &c.

Prices and Illustrations Post Free on Application.

D. BRUCE PEEBLES & CO.,
TAY WORKS, BONNINGTON, EDINBURGH.

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